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EDITORIAL NOTES.

South Metropolitan Affairs.

THE meeting of the South Metropolitan Gas Company on Wednesday was of the character which is vaguely, but intelligibly, indicated by the epithet "historic" applied to it by one of the speakers. It was the first official appearance of the Chairman before his own special public after his knighting; and his reception was suitable to the occasion. Apart from this incidental feature of the meeting, the proceedings were marked with a deep enthusiasm which could be felt rather than seen or heard—a sentiment such as can be understood to animate an army that has won a victory, but is not disposed to boast. For there can be no gainsaying the quality of the statement of the position of the undertaking then and there unfolded. The rewards of brilliant administration are now being reaped, and the Gas Company which supplies South London, and in so doing has pioneered the gas industry of the country, enjoys an unrivalled position of financial strength and industrial potentiality. And since these things do not come by wishing for them, but are the meed of those who know how to take their opportunities and interpret the signs of the times, the proprietors of the Company are justified in praising those who have done so much to place the undertaking on the pinnacle of success it occupies to-day. The South Metropolitan Gas Company without Sir George Livesey is unthinkable; and the same observation might be extended and applied to the gas industry at large. Yet there is obviously a very particular sense in which the achievements of Sir George Livesey in gas administration are an asset of the South Metropolitan Company; and the proprietors would be unworthy of their good fortune if they failed to realize how much their Chairman stands for in the undertaking which he, more than any other force, has made what it is.

Sir George Livesey is seen at his best when expounding the affairs of his Company. He has several "bests," of course; and those who have also watched him in the chair of witness in a Parliamentary Committee-room, or listened to his talk on a point of gas engineering, may reasonably doubt which glimpse of his powers is the most impressive. But he is really most of all at home when telling what the Board are doing and pondering in the interest of the South Metropolitan co-partnery. He had a good opportunity on Wednesday, of which he made full use, for contrasting the facts of experience of the supply of 14-candle gas with the forebodings of the opponents of the Company in 1900. It is truly a dramatic sequel to the Company's bold enterprise, that the London County Council should now so completely throw over their own advisers, and propose to apply to the rest of London the very regimen which they resisted on the ground that it would prove ruinous to the consumers of South Metropolitan gas. It is not often that parliamentary precedents offer such a striking record. The Chairman also did his best to rub in the lesson of the Rotherhithe Electric Lighting Order; and he took the opportunity for speaking his mind on Municipal Progressivism. His language in this regard was strong; but the evil is one that calls for sharp remedies. It is monstrous that a pack of Socialists, with, as a rule, no personal stake of any magnitude in the localities they are supposed to represent, should have power to bleed the large ratepayers—who are not even possessed of single votes—in support of their reckless adventures. This possibility of rating unrepresented hereditaments for local purposes is a scandal of our local government which will have to be removed when the whole system of local taxation comes before Parliament for reform, as it must do shortly, if not next year. It is difficult to speak positively about parliamentary pledges; but we are under the impression that a sort of pledge has been given that the existing Government will tackle the subject next session. If there is any chance of this, it will be advisable to have a deputation to the proper quarter betimes, in order to ensure the attention of Ministers to this grievance.

On the subject of the Welsbach negotiations, Sir George had some pungent observations to offer, notably as to a certain statement made by the Governor of the Gaslight and Coke Company at that Company's meeting, which, in Sir George's opinion, might bear the interpretation that his own well-known action in regard to the Welsbach Company was unnecessary and useless. There is another story, also—that the Board of the Gaslight and Coke Company declined to avail themselves of the improved terms with the Welsbach Company, which they did nothing to procure, merely for the reason that the name of George Livesey appeared in the agreement. The only thing that happened was that a special form of agreement was written out, from which, in deference to the susceptibilities of the Horseferry Road, the objectionable name was omitted. The little-mindedness of this performance may help to explain how the Gaslight and Coke Company has sunk to its present condition, and is not reassuring for its future.

After all, the pleasantest feature of the South Metropolitan Company's affairs is the profit-sharing and industrial co-partnership. Gas companies may flourish or may fade, or pay an extra point or two of dividend, without creating very much interest for the outer world. But here is a social experiment, of considerable magnitude and vast potentiality, being worked out alongside the common round of gas making and profit earning. It can never be said of this Company that they failed to try to do something in their prosperity for the good of the community at large. They are not merely making gas and earning good money, but are creating a new industrial order. There is a certain cheap cynicism abroad, which reckons industrial profit-sharing to be an exploded idea. The inspiration of this thought is Trade Unionist, and proceeds from the wish for it to be true. The South Metropolitan example is one of the most damaging of all the adverse influences to which the cause of Socialistic Trade Unionism is exposed; and, naturally, those who hold by the latter would like to see the former destroyed. Sir George Livesey, however, is not the man to be quelled by a sneer; and he stoutly maintains that, so far from being exploded, the true idea of industrial co-partnership has scarcely dawned upon the honest and well-meaning, but dense, British mind. In this connection, the few words of Mr. Bush, the Secretary of the Company, on the amount of the workmen's savings, are of high import. It is a pleasant practice of the "Pall Mall Gazette" to publish on Saturdays a selection of notable sayings picked from the week's reported oratory. Last Saturday, among the rest, the following appeared: "The only satisfactory "and certain method of reconciling Capital and Labour is "to make Labour Capitalists."

Gas Companies' Experiences and Tar Over-Production.

THE official reports and directorial utterances which are now daily reaching us on the working of the gas company enterprises of the country exhibit, on the whole, a very satisfactory condition of affairs, and there is a promise, with dull weather and low temperatures, of even better returns for the current half year. The debilitating influence of the high price of coal which ruled in 1900 and 1901 is passing away, although, it is true, the level of prices which obtained in the early part of 1899 has not yet been reached. But there is a pleasant feature, which seems to be fairly general in the half-year's accounts, and that is that the revenue from residuals, taking them altogether, has not shown a larger decline than might have been anticipated. It is a usual experience that, when coal prices give way, residuals (more particularly coke) also show an unkind briskness in descending in value; but, in comparisons of accounts for the past six months with those for the first half of last year, there is nothing alarming to be found in the reduced revenue from this quarter—in fact, only the expected has happened, and in most cases there is good ground for congratulation that the position is not worse than it is.

An illustration of the actual course of the prices of coal

during the past three-and-a-half years was given by Mr. Corbet Woodall in his speech last Saturday at the meeting of the Tottenham and Edmonton Gas Company. In the case of this Company, it is seen that, while there have been savings in coal and oil in the past half year to the extent of £8300, the loss on residuals have not amounted to more than £2000. But a more striking illustration is to be found in the report of the proceedings at the meeting of the Croydon Commercial Gas Company. There, while they have had, in comparison with the first half of last year, a decrease of £13,600 in the charge for coal, the revenue from residuals has only suffered by £1600. Such an experience may perhaps be unique; but there it is. Then the Crystal Palace Gas Company had a reduction on coal and oil of £7712; while the receipts for residuals show a decline of £1775. Some Chairmen of Gas Companies, in their addresses to the shareholders, have been rejoicing in the lessened charges for coal, but have been bemoaning the loss on residuals. If, however, they examine the matter a little more closely in the light of previous experience, they may come to the conclusion that there is something for congratulation in the fact that the fall in the value of the latter is not greater than it has been.

On this subject of residuals, Sir George Livesey had something to say at the meeting of the Crystal Palace Gas Company on Friday; his remarks being directed more particularly to the question of the low value of tar. Sir George's recollections on gas matters carry him back to half-a-century ago; and the prices of tar then and to-day, he tells us, exactly correspond—that is to say, the 1d. per gallon obtained then is all that can be got to-day. And yet what a number of things have happened since then to make tar a positive necessity in the world's manufactures and requirements! But nevertheless only an ephemeral enhancement of the value of tar has ever resulted from the various discoveries. The cause of this is plain to everyone interested. Since the time with which Sir George makes his comparison, there has been a constant progression in the demand for the staple commodity of the gas industry; and the growth of business in that direction has had as an inseparable accompaniment an increasing production of tar, until now, and for some years past, we are and have been face to face with that effectual barrier to higher prices, over-production. Yet nothing can be done to stop the production. The consumption of gas, there is every promise, is going on almost everywhere—incandescent burners notwithstanding—with at least 4 to 5 per cent. persistency; and every ton of coal carbonized to meet the additional demand for gas means so many more gallons of tar to be disposed of in some way or another. What tar will come to under these conditions, with over-production already here, no one can tell. It can only be fervently hoped that something unforseen will "turn up" that will absorb the growing surplus. But a new market has yet to be found; and there is the present position claiming urgent consideration. Though nothing can be done to stop production, something might be attempted to lessen the amount of tar that finds its way into the market. The only suggestion, however, that Sir George can make to gas undertakings for the improvement of the existing condition of the market is to reduce the available supply by burning it. This is an old specific. But it is the only practicable one which can at present be offered; and if gas undertakings will accept the advice, and put it into practice, then, though it may not do much towards improving prices, it will help to restrain further depression. In dealing with this question, Sir George Livesey had a story to tell concerning the Gaslight and Coke Company, which shows that the gas industry have nothing to thank them for on account of the manner they have wielded their powerful influence in the tar market.

In the reports of the meetings of the three Suburban Gas Companies mentioned in the second paragraph, there are many points which deserve the attention of the administrators of the gas industry generally. In the Crystal Palace Gas Company's meeting, there are, in addition to the subject of tar, some observations by Sir George Livesey on the rates of increase and decrease of dividends under the sliding-scale which may serve for the guidance of other companies. It will also be seen that he is so satisfied with his experience of workmen representation on the Board of the South Metropolitan Gas Company, that we appear to be within measurable distance of seeing the privilege of taking part in the direction of the Crystal Palace Gas Company conferred upon the workmen of that concern. In the Croydon meeting, the comparative prices obtained for stock sold locally and in London are given; and they are favourable to the disposal of stock in the district. Besides this the Company have been successful in placing on their list of shareholders a number of small local investors, which is a policy that has many recommendations. Then at the Tottenham meeting the financial aspect of dealing with replacements of plant formed the main topic upon which Mr. Corbet Woodall dwelt. In both Sir George Livesey's and Mr. Woodall's deliverances to the shareholders over whom they preside, we rarely look in vain for matter which has an application and interest beyond the undertaking immediately concerned; and no disappointment can be felt on the present occasion.

The Irish Association Meeting.

THE wisdom of the step taken two years ago, in converting the North of Ireland Association into the Irish Association of Gas Managers, was fully borne out by the meeting which was held at Cork last Tuesday. It had been arranged to hold the meeting in Coleraine—the town in which the President (Mr. S. B. Langlands) resides; but, on account of the International Exhibition being held in Cork this year, the Committee, with the approval of the members, changed the venue from the extreme north to the south of Ireland. Such a radical change of arrangements would, in the case of almost every other Association, have sufficed to wreck the meeting for the year. But in gas matters Ireland is a "Nation;" and the attendance of members was most satisfactory—north, south, east, and west, being all thoroughly represented in the gathering. The Corporation of the ancient trading city of the south kindly allowed the meeting to be held in the Council Chamber; and the Lord Mayor attended and gave the Association a cordial welcome. Throughout the day the members transacted their business, and in the evening they were entertained by the Cork Gas Company, after which the Exhibition claimed their jaded attention. In the latter, it is to be noted that gas exhibits are few; there being only two stands by firms dealing in appliances used by gas manufacturers. There are one or two gas-engine exhibits; but there is very little lighting by gas in the grounds or buildings. This we may pass as an oversight on the part of the Executive—due not so much, probably, to ignorance of the important position which gas holds in the domestic and industrial worlds as to a desire to give prominence to Irish products. And we must acknowledge that, taking full advantage of a charming setting for the Exhibition, they have brought together a more instructive collection of exhibits than has in all probability ever before been seen in a Provincial Exhibition.

There was a full programme of business for the meeting; and it was made fuller still by the appearance, at the last moment, of Mr. C. B. Tully, of Sligo, with an additional paper upon his method of working prepayment meters. Mr. Tully is an energetic inquirer after the best methods in both the lighter and deeper branches of his profession. He works with an energy and resource which makes it impossible to regard as likely his long residence in isolation at Sligo. The presidential address of Mr. S. B. Langlands was a very thoughtful production, leaning to the scholastic, which was natural in one who has more recently than many of his brethren been in the hands of the teachers. The need for more technical education was pressed home; and then, in the closing passages, a glimpse was obtained of the benefits to be derived from the higher-grade instruction, in the ease with which he handled such subjects as coal buying and sulphate disposal. Professor Tichborne's lecture was not suitable for discussion, but is eminently so for study; and if it does not induce some to institute the process of testing for themselves, the result will be disappointing. Mr. Syme, of Naas, was not very well treated for his handling of the subject of how to extend the use of gas-cookers. It may be that he put forward nothing which was not known before; but of how many papers read at such meetings might not the same be only too truly said? Mr. Tully's two papers were, as usual, full of original matter, dealing with subjects that are practical and easily attainable. The paper by Mr. T. J. Reid, of Ballina, upon gas affairs in the West of Ireland, is, unfortunately, a narrative which too many could tell, of struggle, with slender means, to overcome physical difficulties. The reward for all his toil lies in the success which he has attained.

This, briefly named, was the technical business transacted.

It was well and expeditiously handled; and for this credit is due to the President and to the right-hand man of the Association—Mr. James Whimster, of Armagh, the Hon. Secretary and Treasurer. It is gratifying to observe that Mr. Whimster's services to the Association are to be recognized, by his being placed on the way for the chair—an office to which his services fully entitle him, and which he is specially fitted to adorn. Of Tuesday's meeting there are no memories except those which are pleasant; and if the profit derived from the gathering be at all commensurate with the happiness disseminated by it, the Cork meeting will certainly hold a very high place in the annals of the Association.

Cheap Power Gas for Glasgow.

THE report of the Glasgow Corporation Gas Committee does not usually contain much matter for debate, either at home or farther afield; and little objection is likely to be taken to a state of affairs which enables the Committee to recommend a reduction in the price of gas from 2s. 6d. to 2s. 4d. per 1000 cubic feet for gas sold for lighting and general purposes, and, by a special and new further reduction of 4d., to 2s. for gas-engines supplied through a separate meter. This new departure on the part of the Glasgow Gas Committee merits appreciative notice, inasmuch as it signalizes the beginning of a thoroughly up-to-date policy, the key-note of which, it is to be believed, is the desire to make gas more useful in the general service of the community than it has hitherto been. Nothing but the best of wishes can be offered to those who have embraced and are carrying out this enlightened policy. The Corporation gas-works are being greatly enlarged, and, in the hands of Mr. Foulis, they will be built and equipped in a manner best suited to the needs of the busy future which awaits the undertaking. The gas-engine already does a great deal of the work of the city industries, which are probably more varied than those of any other working community; but there is more gas power to come. By this fresh move, the Gas Committee display their willingness to cater for an enlarged gas-engine demand, which will doubtless follow in due course. If, as we understand is the case, this is the first offer, in the records of the Glasgow Gas Committee, of a special reduced rate for a particular class of business, they are the more to be commended for seeing their way to making a precedent in favour of what the best contemporary judgment regards as the class of business most deserving of such encouragement. It is a rather singular circumstance, as revealed by recent proceedings in the Corporation with regard to the public lighting of the city, that many good Glasgow citizens do not appear to appreciate their gas as it deserves. This reserve is probably a legacy from the times when gas was a costly luxury everywhere in Scotland, and its capabilities were as generally unknown as the figment of its high illuminating value was held in exaggerated esteem. Though in a general way the fashion of Corporation deputations in search of knowledge is not one to be kept up, yet the suggestion that some Glasgow corporators should go about a little, and see how useful other places make their gas, seems a good one in the circumstances.

Home Office Report on the Compensation Acts.

WE publish elsewhere to-day a digest of the information contained in the Home Office annual report upon the working of the Employers' Liability and Workmen's Compensation Acts during last year; but there are one or two points in the report to which we would draw special attention here. First and foremost must be recorded a fact which is particularly gratifying to those who have from the start wished success to the working of the Act of 1897—a measure which, far from being perfect though it may be in regard to details of drafting, was destined, obviously, to bestow enormous benefits upon the working classes generally. How, indeed, the drafters were to anticipate every point of difficulty that might arise in the practical carrying out of a measure traversing so vast an area in the field of industrial operations, the critics of the Act never attempt to say. They are content merely to carp. The fact which affords so much gratification is that the number of appeals arising out of cases under the Act shows a sensible diminution in England and Wales as well as in Scotland. The figures in this connection, published elsewhere, rather knock the ground from under the good people who—bearing the Act ill-will because they did not happen to be in a position to claim the gratitude of the working classes for its being placed on the statute-book—have so gleefully pointed from time to time to the "enormous amount of litigation" caused by the working of the Act. Only 84 appeals in the third year of operation of a measure introducing an entirely new principle into the law of the country, including within its scope several million of workmen, and under which tens of thousands of claims for compensation arise every year! Not a very big peg on which to hang the rags of criticism, especially considering that the worthy critics generally include in their diatribes the objection that the Act is not universal in its operation—a circumstance that accounted for 30 appeals out of 87.

It is true that the number of cases determined by County Court Judges is still increasing; but it is to be noted that the number for 1901 includes 139 cases of applications with reference to weekly allowances already granted, and 70 applications for apportionment of agreed compensation among defendants. The actual increase last year was 82 cases only, or barely 8 per cent.—not a matter of serious moment. Anyhow, the magnitude of the benefits bestowed by the Act of 1897 may be estimated from the facts detailed elsewhere. Lump sums amounting in all to £15,048 were paid to 372 injured men; while the weekly compensation granted in case of injury averaged about 12s. 6d. per week—and the number of such cases, although it is impossible to make a reliable estimate of them, must certainly run into six figures. At the same time, the amount of damages awarded to injured workmen, or the representatives of deceased men, in cases brought before the Courts under the Employers' Liability Act, has only fallen off by about £5000 per annum since 1897; so that there can be no question but that the Act of that year has been of enormous value to workers in this country, after allowing for the large sums voluntarily paid by employers to men injured in their service before that measure came into operation.

It may be of special interest to note here that the injured workman appears to obtain rather better terms by agreement than by litigation, with his employer—apart from the fact that by entering upon litigation he runs the risk of losing all chance of compensation upon a technical point of law which the employer would not perhaps consider or press if the man took up a reasonable attitude in regard to his claim, instead of rushing off to the Trade Union's solicitors. Speaking generally, the report for 1901 affords grounds for believing that the Workmen's Compensation Act is operating with remarkable absence of friction; that the volume of "interpreting litigation" is satisfactorily diminishing; and that, without inflicting material hardship on employers, it is conferring very substantial benefit upon the employed.

Trade Unions Learn Nothing and Forget Nothing.

IF there is one truth that British employers of labour need to keep before their eyes, it is that, under any and all of its disguises, the character and the motives of Trade Unionism remain the same, and are as unchangeable as the spots of the leopard. There is a certain amount of mental strain required for the preservation of this attitude, which naturally produces fatigue; and then the custodian of industrial welfare is apt to nod over his charge. This is the moment for which the enemy watches and waits; and woe to the employer who is effectually caught napping! He will awake to discover that the control of his business has passed from him, and that he can no longer call his workshop his own. At the present day, prominent Trade Unionists appear to be agreed that they will pose before the world as good boys, who have learnt the folly of the "strike policy," and never, never mean to do it again. He would be a fool who should believe them. Let but the smallest strike break out with a dog's chance of success, and all the old gang of agitators will elbow one another for the credit of "bossing" it, which means both notoriety and cash. It is the same with the famous principle of "going slow," which the bricklayers in the employ of the London County Council have developed into a fine art, to the mystification of the excellent Lord Welby. If anybody believes that it has ceased to be the ruling principle of the model Trade Unionist to do as little as possible and get the most money for it, he can be commended for enlightenment to the latest pronouncement of the Trade Union Federation on this subject. Likewise as to the presumption of the Trade Unions to "recognition"—meaning the monopoly of employment for their members.

It is perfectly idle for employers to protest that they do not object to Unions in themselves, but are willing to admit all men to work if they will, asking no questions. The employers may mean to be impartial; but nothing is farther from the intentions of the men. The latest example of this comes from Sheffield, where the Britannia metal workers have just lost a strike for "the principle." The employers saw how the matter stood, and united to fight the society monopolists to a finish. It was not a question of wages; for the employers have given an advance. The real tussle was over the old bones of contention—apprentices, and freedom of labour for non-society men. After five months, the employers have won, and are therefore entitled to be called masters once more. Of course, the masters repeat that they have no quarrel with Trade Unionism as such—that, in fact, they rather like it, as introducing something like order into the trades affected. But they decline to be dictated to by any Trade Union official as to the men they may or may not employ, and the way they may conduct their business. It is the old story. A Trade Union is admirable in theory, but poisonous in practice. It will ever be so; for the Trade Union official who will not "try it on" when he may see a chance is yet to be born.

A Word with Mr. Howard Charles Ward.

THERE is a well-known story of an Oxford Don who was a person of note in his day, which runs to the effect that a man of his college who was taking leave, after passing a creditable course, asked the old Principal if he could give him a parting word of advice that would be useful to him in his future career. The reply was: "Always verify your "references." The counsel is of conspicuous merit, which is apt to appear when, as so frequently happens with men in every walk in life, it is disregarded. An example in point was furnished by Mr. Howard Charles Ward, when speaking in his capacity of Chairman of the Brentford Gas Company at the recent general meeting of the Company. Mr. Ward is also Deputy-Governor of the Gaslight and Coke Company, and with a hazy remembrance of a certain comment passed in the "JOURNAL" upon the hackneyed official excuse offered for the continued falling off in the latter Company's sales of gas, he made use of his own platform for the purpose, as he thought, of controverting this criticism. Only he did not speak by the book. He said that "there had been some comments made by scientific "journalists to the effect that the weather had very little to "do with the consumption of gas;" and he proceeded to demonstrate the contrary by citing figures as to a seasonal variation in the rate of positive increase of the Brentford Company's sales. We make no scruple about "putting on "the cap," because there is no doubt as to the speaker's text, which must have been our "Editorial Note" of the 5th inst. Reference to this, however, fails to discover anything, either in so many words or in any fair inference from them, to the "effect" which was in Mr. Ward's mind. The correct interpretation of gas statistics is part of our business; and while we do not for a moment suspect Mr. Ward of intending to put a false construction upon printed words, we must claim the common right to a proper and logical one. Nobody who follows the gas industry is likely at this time of day to overlook the large and growing influence of the temperature of the atmosphere on the demand for gas. As a matter of fact and of record, the "JOURNAL" published years ago the first convincing piece of evidence of this truth, in the diagram prepared from registers kept by the South Metropolitan Company, in which the point was made clear by the ingenious device of reversing the thermometric trace to show its parallelism with the trace drawn through the maxima of the corresponding outputs of gas. We have never forgotten the lesson, nor failed to make allowance for the fact; but what we have at times deprecated is the exaggerated use made of it in some quarters—as, for instance, on the occasion in question (not for the first time).

Nothing in the article to which Mr. Ward meant to refer, but did not do so with adequate care, states or suggests that the weather has "very little to do with the consumption of gas." Of course it has—a great deal to do with it; but not to the exclusion of every other influence bearing upon the trade. If the weather of the past half year was competent to produce this disappointing effect upon one Gas Company in the latitude of London, why did it not do as much for its neighbours? Mr. Ward knows as well as anybody that the great trouble of the Gaslight and Coke Company is the popular belief that their gas is dear—dearer than it should be. What we have constantly endeavoured to bring home to the perceptions of those responsible for the policy of the Horseferry Road, of whom he is one, is the folly of pretending—as the Governor did again the other day—that the common human repugnance to deal more than can possibly be helped with a shopkeeper reputed to be "dear," makes an exception of gas. It does nothing of the sort. Such a popular feeling operates in an infinite number of ways; and this, combined with the rigidity of the Horseferry Road in refusing point-blank to meet other wishes of large or small consumers in the smallest degree, is far more likely to strike the ordinary observer as adequate reason for the depression that has overtaken the affairs of the Company, than any forced official explanation based on a single fact good enough so far as it goes.

With particular regard to the varying rate of increase in the demand for gas in the Brentford district—where there does not appear to be any dissatisfaction with the Company—perhaps Mr. Ward will have patience to pay heed to a different explanation of the fact. It must be perfectly clear that where there is a considerable increase in the use of apparatus for applications of gas other than lighting, the effect of these will be most felt at such seasons as "the turn "of the year," especially if, as at present, the increased use of gas for lighting is subject to the diminished individual rate of consumption due to the popularity of incandescent burners. It is obviously impossible to say how all these influences will work out in the books of a particular gas company; but it would be a bad look-out for any gas undertaking of which the Directors should remain content to sit with folded hands in face of a decreasing trade, and murmur "Kismet!" with a vote of thanks to a kindly thermometer for sparing them the obligation to find a better excuse.

The Petroleum Market.

THE state of the petroleum trade continues to attract a considerable amount of newspaper attention, though nothing like so much as it would do if there were any real relation be tween the bulk of the matter that fills the newspapers and the important forces which move the commercial world. Still, some journals admit the existence of a petroleum question; and it behoves us to look after what they say in order to see whether our own recorded statements in this regard are likely to prove right or wrong. There is some satisfaction in learning that, so far, we have not gone much astray. The Standard Oil Company have not acquired the sole control of Texas oil, but will either deal in it as an ordinary business firm, or treat it as a rival. It is also reported that the Standard Company have to reckon with a competitor nearer home, in the Pure Oil Company, which represents the independent producers who have always existed in a small way in the back settlements, where they refused to capitulate to the Standard Company. Latterly the Pure Oil Company have got a pipe-line of their own to the Atlantic seaboard, and are organizing for extensive business in this country. Then there is the Russian supply, which is to be marketed once more on competitive terms. It is admitted that hitherto there has been an understanding between the great importers into the United Kingdom of Russian and American oil, which has not been to the advantage of the consumer. If, as is now reported, there are to be two Russian and two American oil-exporting organizations, besides the Texas and other fuel-oil supplies, prices in this country ought to go down. That is to say, they would fall if the trade were in a normal condition. But it would be a strong assumption to take it at that.

Illuminations, Temperature, and Gas Consumption.

We have been favoured by Mr. J. W. Field, Mr. Charles Carpenter, and Mr. H. E. Jones, with the figures as to the consumption of gas on the three days of the Coronation illuminations in London—viz., Aug. 9, 11, and 12; and they are of considerable interest, as they bring into prominence the effect of the factor of temperature in making comparisons to ascertain the influence of illuminations and holidays on gas consumption. This point was mentioned in our recent article on the subject. In that article, it was conclusively proved, that, other conditions being about equal, illuminations do not compensate for the loss which they produce in the ordinary consumption. Now we have figures

which show that a lower temperature than on the day with which the comparison is made may turn the scale the other way. Coronation day was a holiday in London; but on the Monday and Tuesday, business proceeded almost as usual. The crowded condition of the streets, however, during the lighting hours of those days was sufficient to give one the idea that the major part of the gas consumers in London had left their homes to see the streets in their temporary radiance; and consequently that a considerable amount of the private consumption of gas would be lost to the gas companies. During these days, however, the temperature was considerably lower than on the corresponding days of last year; and this rather spoils the comparative value of the returns.

The Figures.

On all three days, the Gaslight and Coke Company had increases upon their consumption last year. It was in their district, of course, that the illuminations were of the most extensive character. On the 9th, the consumption was 39,848,000 cubic feet, as compared with 38,118,000 cubic feet on the corresponding day last year; on the 11th, 45,451,000 cubic feet, as compared with 39,999,000 cubic feet; and on the 12th, 44,786,000 cubic feet, as compared with 40,214,000 cubic feet. But anyway, on such consumptions as this Company's, the large extent of the illuminations and the low temperature combined did not make the upward fluctuation more than we imagine is experienced on ordinary days; so that, had there been no illuminations and the conditions ordinary, with the low temperature the days in question might have shown even greater increases. The Saturday, which was a holiday, be it noted, did not produce such a great increase as the Monday and Tuesday. In the cases of the South Metropolitan and Commercial Companies, there were reductions on the Saturday; but increases on the Monday and Tuesday. The consumption of the South Metropolitan Company on the Saturday was 23,957,000 cubic feet, as compared with 25,926,000 cubic feet; while the Commercial Company registered an output of 4,913,000 cubic feet, as compared with 5,544,000 cubic feet. Here it must be borne in mind that the inhabitants of the East of London are for the most part industrial, and not likely to make a display; but the great breweries, theatres, and music halls and some private houses did illuminate. Owing, however, to the suspension of the ordinary trade and business, the domestic and shop consumption was smaller than usual on the Saturday; and therefore the restriction in demand in these directions caused the total output to be less than on the corresponding day of last year. The same remarks would, of course, apply to the Southern Company. But both Companies had a similar experience to the Gaslight and Coke Company on the Monday and Tuesday. On these days, the South Metropolitan Company metered outputs of 24,259,000 cubic feet, and 26,049,000 cubic feet respectively; the corresponding days' figures being 22,984,000 and 23,871,000 cubic feet. The Commercial Company on the Monday registered 6,275,000 cubic feet, and on the Tuesday 6,470,000 cubic feet; the figures for the same days last year being 5,720,000 cubic feet, and 5,887,000 cubic feet. For the gas companies, the low temperature certainly came at an opportune time. This, by the way, suggests that, as the summer has been a dull, cold one, the consumption returns at the end of this half year will give much satisfaction to gas proprietors.

Good Working in Hereford.

Readers of the "JOURNAL" do not require to be told that our predilections have always been for private as against municipal management of gas undertakings. At the same time those who do not agree with us on this point must acknowledge that we do not close our eyes to evidences of ineptitude in connection with the former or of efficiency with the latter. We are quite as pleased to recognize good work done by the gas committee of a local authority, acting under the advice of a competent technician, as we are regretful at having occasionally to animadvert upon business methods of directors which we do not consider to be for the ultimate good of the undertaking concerned or of the industry of which it is a constituent part. It is in the former spirit that we direct attention here to the annual report recently presented by Mr. W. Parlby to the Gas Committee of the Hereford Corporation, the principal portions of which are given in another column. To signalize only one point, some time ago he submitted a report on the prepayment system, the advantages to be derived from which were so clearly put that the Committee decided to introduce it. What has been the result? In the past financial year, while the increase in the ordinary consumption was nearly $5\frac{1}{2}$ million cubic feet, the prepayment consumption went up rather more than $4\frac{1}{4}$ millions; the total being 15,167,800 cubic feet, distributed among 1500 consumers, or an average of 10,112 cubic feet each—a figure closely approximating to Mr. Parlby's original estimate. It is probably due to a combination of enterprise and good management that the undertaking is in its present favourable position. Of the total amount of loan indebtedness in connection with it, £80,668 had been extinguished, by means of the sinking fund, on the 25th of March; leaving only £34,881 outstanding. Mr. Parlby points out that this large sum has been paid off within a period of twenty-nine years out of the earnings of the undertaking; and we agree with him in thinking that the Corporation are to be congratulated upon possessing a property which has been able to bear so heavy a drain upon its finances, after meeting all its working expenses and interest, in view of the fact that other municipal undertakings are allowed fifty and sixty years in which to repay the principal borrowed. There appears to be every probability of the Hereford Gas-Works being, as the Mayor suggested when Mr. Parlby's report was recently before the Council, even more profitable and useful to the city in the future than they now are, especially in the event of the adoption of low-grade gas.

The Photometry of Low-Pressure Gas.

The changed conditions of gas supply in the Metropolis consequent upon the reversion to the 14-candle standard of illuminating power, with the possibility of a further reduction, raises the question of the method of testing to be employed in order to develop the true light of any particular grade of gas. It has already presented itself to Mr. H. Leicester Greville, the Chemist to the Commercial Gas Company, who has made some preliminary investigations into the matter, the results of which we are pleased to be able to lay before our readers in the communication from him which appears in another column. When carrying out certain calorimetric experiments, he estimated the light of different grades of coal gas under varying conditions, with the immediate object of discovering the best method of developing the maximum light. It will be noticed that Mr. Greville is careful to point out that his tabulated results are fragmentary, and require to be supplemented by further tests which he hopes to publish at an early date. In the meantime, his figures afford a basis for some useful comments and inferences. He draws from them the conclusion that "the present burners constructed for 16 and 14 candle gases fail to do justice to a gas when a material fall occurs in the illuminating power;" and he urges that this is unfair to the gas companies. We commend the article to our readers' attention, and await with interest a further contribution from the author on the subject, which is one that is now engaging his special attention.

The Damage to Gas-Mains at Ilford.

After some little delay, the proceedings taken by the Ilford Gas Company to recover compensation for the damage done to their mains by the sewerage operations of the District Council have resulted, as will be seen by the report which appears elsewhere, in fixing the responsibility upon the Contractor. As briefly mentioned last week, the considered judgment of Mr. Justice Lawrance was delivered on the 11th inst.; and in the course of it, he directed special attention to the words in the contract to the effect that the Council were to be indemnified by the Contractor from all claims and actions in respect of any damage occasioned by the neglect, mistake, or default of himself "or any person employed by him, or otherwise howsoever," in the execution of the works. His Lordship could not see, nor can we, any escape from these words. Would there have been any damage to the gas-pipes had it not been for the sewerage operations? Obviously not. Then "howsoever" that damage was caused, the Contractor for the works was liable. Any other conclusion seemed impossible; nevertheless it appears that the matter is to be carried further.

The Cost of Coal and Water Gas.

It would be a concession to the technical information of the gas profession if the Directors of the Tottenham and Edmonton Gas Company could see their way to dividing in their statement of accounts the quantities of coal gas and water gas manufactured, instead of lumping them together. A large amount of useful information regarding the expenses of the production of the two gases is given; but it does not go quite so far as the particulars appearing in the accounts of the Crystal Palace Gas Company. If figures on the same lines could be allowed, they would be very valuable for purposes of comparison. The Chairman (Mr. Corbet Woodall) and the Engineer (Mr. A. E. Broadberry) are both enthusiasts on this question of carburetted water gas; and we feel certain that—unless there is some real objection which is not apparent on the surface—they would, if the additional information would really be helpful to the gas industry, grant the fuller particulars. It is common knowledge that Sir George Livesey, the Chairman of the Crystal Palace Gas Company, has no particular love for carburetted water gas; while Mr. Corbet Woodall, the Chairman of the Tottenham Company, is one of its strongest advocates. Therefore, to have the figures of the latter Company in the same complete form as those of the former Company would be very acceptable. Mr. Woodall, in addressing the proprietors of the Tottenham Company on Saturday, gave some figures which possess far more interest for the professional gas engineer than the laity as represented by the greater number of the shareholders. He stated that the relative cost of making coal gas and carburetted water gas in the half year had been 20·99d. and 17·04d. per 1000 cubic feet respectively—the coal gas having an illuminating value of 13 candles, and the carburetted water gas of 19 candles. The additional costs incurred in the six months for renewals had been charged equally to both gases; but, deducting these, the costs would be 18d. and 15d. respectively. These figures show an advantage of 3d. on the side of carburetted water gas, and a superior illuminating value to the extent of 6 candles.

The Value of Illuminations.

Illuminations as a means of demonstrating public joy have, as was recently remarked in the "JOURNAL," become increasingly popular. But apart from their symbolical purpose, and the effect they have in enhancing the enthusiasm of the time, of what use are they? Is not the money spent upon them wasted; and could it not be devoted to some more useful object? These are questions which in different forms have been put to us, and no doubt to others, during the last few weeks. They open up a very wide field for cogitation and debate; and they can be argued from so many standpoints that it is really difficult for one to bring himself to anchor on the question of whether he is or is not favourably inclined to illuminations—of course, regarding the question outside any interest in the purveying of gas. Writing with a view to discussing the question only just lately, to almost every argument in favour one of equal strength opposed itself to the contrary; and at length the subject was abandoned—the writer unreservedly ranging himself, like the Vicar of Bray, on the most popular side for the time being. Illuminations as representative of rejoicing are an ancient custom; and the public have a liking for doing, on occasions such as that of the Coronation of His Majesty, what their forefathers did—in, as far as possible, an improved style. And there is no doubt whatever, from what has been seen throughout the country during this Coronation time, that the *vox populi* is in favour more than ever it was of illuminations as an aid to the manifestations of joy. In addition to this, there is a point in favour of illuminations against which we cannot find any substantial argument; and that is their value as a means of impressing important periods in history upon the young mind. Illuminations upon the scale of those recently seen are not everyday occurrences; and, indeed, it is only on the occasion of some event that is epoch-marking that such gorgeous displays are made. These displays help to stamp the event, and the circumstances surrounding it, on the young (and for the matter of that too the older) mind. Those of us who have advanced to middle life and beyond, and who, in the days of youth, had the advantage of living in cities or towns where events which called forth public joy or thanksgiving were celebrated by illuminations and in other ways, well remember the occasions through the impression made on the mind at the time by the striking and extraordinary accompaniments of the events. Personal experience is constantly proving that the witnessing of an event or an associated act fixes it deeper in the mind than the mere reading or hearing of it. Comparatively few actually witnessed the crowning of His Majesty the King. But thousands upon thousands of young people saw the illuminations in London and provincial centres on the 9th and other days; and the impression made by the glittering show will keep green in their memories this happy occasion of the times in which they live. Therefore illuminations have—in addition to their representation of joy and the delight they afford the people—an educational value which is purchased cheaply by the temporary cost incurred.

WATER AFFAIRS.

The Question of Underground Water Rights.

THE last day of the Trinity Law Sittings this year will be memorable, for those who are concerned in the supply of water, for the addition by Mr. Justice Farwell, in the Chancery Division of the High Court of Justice, of a very important chapter to the legal literature bearing upon the rights in underground water. The case his Lordship had to deal with raised a point on which there had not previously been any decision in English law; and therefore, at the conclusion of the arguments, he took time to consider his judgment. This he delivered on Tuesday; and it will be seen from the report which appears elsewhere that it was the outcome of a thorough investigation of a very intricate subject. The question arose in interlocutory proceedings in an action brought by the Corporation of Bradford and other persons having rights in the water of a stream called Morton Beck, one of the principal feeders of which is the Sweet Well Spring, on a portion of Morton Moor belonging to a Mr. Ferrand. Permission was given by this gentleman to the Shipley District Council to sink certain wells upon his land, in close proximity to the spot where the water of the spring flowed to the surface; and they duly exercised it early last year. The effect of their operations was, the plaintiffs alleged, to intercept and divert the waters flowing "in their well-defined underground channel," and prevent them from reaching the surface in the usual way; and an injunction was applied for to restrain the defendants from continuing such alleged diversion, as well as an order for the removal of all their works by which the flow of water was being wholly or partially obstructed. The defendants denied that the water flowed in a "well-defined or in an ascertained channel under "the surface of the ground" before issuing at the spring; and they pleaded that if it did so flow, it was not in an "ascertained or known channel." The later proceedings opened with a motion on behalf of the plaintiffs for leave to enter upon the land in question to ascertain the accuracy or otherwise of the defendants' statements; but Mr. Justice Farwell refused to grant it, on the ground of the insufficiency of the evidence submitted in support of the application. The plaintiffs were dissatisfied, and eventually it was arranged that a direct issue should be raised between the parties upon the point of law, and that his Lordship should be asked to decide this point before the trial. The defendants then amended their defence, and submitted that, assuming that the water flowed to the spring in a defined channel, but that the existence and course thereof could not be ascertained except by excavation, the plaintiffs had no right of action for the abstraction of such water, and consequently were not entitled to maintain the proceedings they had instituted.

The point of law was argued before his Lordship on the 6th inst. For the defendants it was contended that the plaintiffs had no right to prevent them from taking the water unless it flowed in a known as well as in a defined underground channel. It was allowed that no such channel was known to the plaintiffs, and it was further submitted that they had no right to enter upon the defendants' land for the purpose, by excavation or other process, of obtaining knowledge upon the subject. On the other hand, the well-known case of *Chasemore v. Richards*, which was decided by the House of Lords in 1859, was cited; and it was contended for the plaintiffs that it was not essential that the

channel should be known—it was sufficient if it was defined and ascertainable. In short, it was urged that the principle applying to a surface stream was also applicable to water flowing in a defined underground channel. His Lordship, in giving judgment, passed in review and commented upon most of the important decided cases bearing upon this question, all of which were fully dealt with in the interesting lectures delivered by Lord Robert Cecil and Mr. Shiress Will, K.C., which it may be remembered were reported in our columns towards the close of 1899 and early the following year. Referring specially to the case already mentioned, his Lordship stated that, in view of the manner in which it was argued and decided, he could not treat the right to the flow of a stream as founded on a rule of positive law, the origin of which had been lost by the progress of time, but felt bound to try the principle upon which the right rested. The foundation of it, as set forth in all the cases, he found to be *jus naturæ*, which expresses that principle in English law which is akin to, if it is not actually derived from, the *jus naturale* of the Roman law. He therefore considered he was not introducing any novel principle by regarding the natural law on which the right to running water rests as meaning that which is *æquum et bonum* between the upper and the lower proprietors. What then, he asked, was fair and reasonable between the parties? That, by not interfering with the running water, each should avoid injuring the other, and thereby escape injury to himself. Looking at the case before him as one to be decided upon the general principle he had cited, he came to the conclusion that the plaintiffs had no right of action. The spring in question was fed *ex hypothesi* by a subterranean stream flowing in a defined channel from higher ground, which might extend to many acres and belong to a number of different proprietors. If the plaintiffs were right, no proprietor of land above the spring could sink a well on his own ground without incurring much greater liability for interference with it than that unsuccessfully sought to be established in *Chasemore v. Richards*. No one, however, could tell where or in whose land the stream ran. There must consequently, he said, be a declaration that no right exists in underground water, where the course of its channel is unknown. The plaintiffs therefore lose their case, and they have to pay the costs of the application.

Rural Water Supplies.

THE account of the proceedings at the Leicester meeting of the British Association of Water-Works Engineers is completed in the present issue with the paper and discussion on the subject of "Rural Water Supplies." Both have been abbreviated; but in the curtailment, care has been taken not to deprive them of their many interesting points. If there is one class of water supply that presents more difficulties than another to the water engineer, it is that of rural communities, unless, fortunately for themselves, the communities happen to be situated on the line of some copious service to a large city, and can, by right or arrangement, tap the pipe-line for their own needs. It cannot be denied that the supply of the rural populations of the country has in the past been much neglected by local authorities and water engineers; but there has undoubtedly in recent years, at conferences and meetings, been a stirring up of interest, and things are now changed. Local authorities have been brought to a better sense of their duties, and water engineers have been encouraged to give closer attention to the provision of these minor water-supply systems. This awakening we ascribe largely to the greater realization during the past few years of the benefits of association. There has been association of local authorities of all kinds, and the various officials of those authorities have also organized themselves. Opportunity for consultation and discussion has thus been given that was not formerly possessed; and the increased interest in the question of how best to supply rural districts with water, and proper recognition of the advantages which accrue from the sanitary point of view, are, in no inconsiderable degree, the fruits of this intercourse between authority and authority and official and official.

From the standpoint of the engineer, of course the supply of rural districts has not the same attractiveness as the supply to larger communities. The difficulties of the former are many and sometimes almost insuperable. Water has to be found in the locality; money not being so plentiful that the local authority can afford to go far afield. Then the population in a rural authority's district is, as a rule, very sparse, and is dotted here and there in small groups. Here the question of expense again comes in. It costs money to link together by stretches of unprofitable pipes these scattered settlements; and the differences in their levels often mean an abnormal expense in proportion to the service rendered to keep them adequately supplied. Again, the revenue derivable from the limited number of consumers is frequently altogether in incongruous ratio to the initial and working expense of the system; and, as a consequence, there has to be a rate-in-aid throughout the area, and people who perhaps receive no benefit whatever from the supply, through not residing within the area of the service or from other causes, have to make their contribution. Then come grumbling and vexation. It follows that the hardships attending the design and management of such schemes, with so many attendant difficulties and drawbacks, cannot possibly have the same attraction for engineers as schemes which can be conceived, executed, and subsequently operated under more comfortable conditions. But, as already stated, greater interest is manifested in the question now than ever there was before.

We do not suppose that anyone will challenge the statement that probably there is no county in England that is nearer low-water mark as regards prosperity than that of Essex; and not only in the matter of prosperity, but in that of water supply. And it may be that the latter want accounts, in some large measure, for the dearth of the former. However that may be, the authors of the paper read before the British Association of Water-Works Engineers—Messrs. James Dewhirst and Horace G. Keywood—have shown, by the highly interesting schemes described, that, even in Rural Essex, if water schemes are properly designed and carried out, they can be made successful, and their success confers benefits on the districts beyond the direct one of having at command a supply of pure water. One of the authors informs us that, since the works have been completed, numerous houses have been erected in the district; whereas for many years previously no houses had been built, and the population was dwindling. This is a collateral advantage to the provision of a water supply of vital value to any thinly populated area; and enlightened authorities in country districts still insufficiently supplied with water will read from this experience a lesson which may bring to them and the areas they govern a prosperity exceeding what formerly would have been regarded as an idle dream. What has been done in Rural Essex—the worst of all districts within knowledge in this country for water—can assuredly be done in almost any rural district in the country.

The paper brought out several interesting matters. The initial and working costs of these examples of rural supplies, and the capability of the systems, are instructive; and they give the reader an idea of the financial stress that would be brought upon a district ill conditioned and situated. Many will feel some sympathy with the appeal that Mr. Keywood urged should be made to the Local Government Board for the lightening of the burden by the extension of the period for the repayment of loans, or its postponement until the undertaking is in a revenue-earning position. But above all the authors of the paper have added to the already large accumulation of argument in favour of the linking up of such water supplies, and the formation of Boards with jurisdiction over the water available for distribution and consumption in extended areas. The authors' object in writing the paper, although undeclared, is perfectly obvious. It is a generous attempt on their part to supply information and experience which may improve the conditions of districts not abundantly blessed in any way, but similarly circumstanced to those in which they have been called upon to exercise their engineering ability.

Rumoured Changes in the Staff of the Gaslight and Coke Company.—A statement was in circulation in several quarters last week to the effect that Mr. John W. Field was resigning his position as Secretary and General Manager of the Gaslight and Coke Company (or had already done so), and that he would be succeeded by Mr. G. F. L. Foulger. In response to a letter addressed to Mr. Field on the subject, someone using the Company's telegraphic address wired yesterday that Mr. Field was absent from town, but that the statement was "quite without foundation."

ESSAYS AND REVIEWS.

RELATIVE ATTRACTIVENESS OF DIFFERENT ARTIFICIAL LIGHTS.

THERE can be no questioning the fact, which is subject to common observation, that present-day practice in the art of artificial illumination exhibits considerable advance upon that of even a very few years ago. This result is chiefly due to the increased prominence that modern industrial developments in the lighting trades have given to the various improved methods of artificial lighting actually in the market. In times when the only choice lay between the flat-flame gas-burner and the mineral oil-lamp of a similar class, there was nothing to arouse particular interest in the subject of lighting on the part of the general public. Where gas was to be had, and came within the means of the possible consumer, it was chosen as a matter of course. The reason for this preference is quite well worth distinguishing and considering with reference to actual conditions. It was, mainly, the greater convenience, saving of labour and trouble, and safety of gas as compared with its only alternative. There was really no comparison between gas and oil lamps in these regards, to which reason is to be ascribed the large business that was done for many years in the provision of private gas-works for mills, factories, and large country houses. If this consideration is steadfastly kept in mind, while reviewing the existing practice of lighting, it immediately appears that whereas in some methods of lighting for which much is claimed by way of brilliancy, cheapness, or other positive advantage, the master-element of convenience is left out of sight, in other cases it forms, far more than is commonly recognized, the ruling recommendation which outweighs obvious drawbacks.

Let us first of all briefly discuss some of these other aspects of modern artificial lights. It is now some years since the common mineral oil-lamp was greatly improved in sightliness and brilliancy, to the slow but sure displacement of the older "Moderator" colza oil-lamps, which, in the middle Victorian era, no self-respecting domestic establishment could do without. The novels of the period are sprinkled with appreciative descriptions of the softness of the shaded lamp-light which ruled in drawing room and study, and the effect was not seldom contrasted with the "garish" gas-light of public places of resort and entertainment. The blame for this relative disparagement of the more popular and brighter illuminant was chiefly due to the gasfitters, who, following what seems to be the common tendency of the last-comers into the lighting business, failed to understand much that was unexpressed in the taste of their public. Electricians made the same error in their turn. Consequently, artistically shaded and diffused gas-light was not much in evidence in those days, except in France, where the stronger artistic temperament of the people showed itself in the general employment with gas-flames of white "opal" globes, although these necessitated the consumption of more gas. It is strange, nowadays, to look back to this period, and mark how utterly unable those who testified to the fact were to perceive and give the reason for the "better gas lighting" of Paris than of any English town.

It is as impossible as it would be ungrateful to omit mention in this connection of the name of William Sugg, who first, with his "Christiania" type of shade globes, set up the correct standard, both of taste and efficiency, in interior gas lighting. There is nothing better, to this day, for the purpose. Meanwhile, gas lighting in general lost nothing by the improvement of oil-lamps already mentioned. The introduction of the round-wick oil-lamps, which remains the highest achievement of invention in this field, while placing oil-lighting on a parity of illuminating effect with flat-flame or argand gas-burners, left untouched the considerations of convenience, labour, and safety, which therefore still turn heavily against every kind of oil-lamp. Even if the incessant endeavours of late years to make the incandescent oil-lamp a rival of incandescent gas had succeeded, this advance would have still left the method of lighting as troublesome, dirty, and relatively inconvenient a system as it ever was. There is something almost pathetic in the efforts made to adapt oil to the principle of a truly distributed illuminant, of which gas was the first example. The nature of the thing is against such a development. Oil-lamps, by whatsoever means they shine, must remain in the portable order of lights, and make the most of the advantages, such as they are—and they are by no means insignificant—of this quality.

It is a familiar observation that as civilization advances, people grow increasingly averse to taking unnecessary pains in their own affairs. Our predecessors, with more or less willingness—for they knew no other way—did many more things for themselves than we are content to do. Our remote ancestors had to go out and catch their hare before they could think about cooking it; whereas we abuse the Government because every householder cannot as yet order his meat from the butcher by private telephone. Down to recent years, nobody regarded it as a hardship to have to strike a match and light the gas. Those who did this, perhaps several times a day, if they thought of the nature of the action at all, would probably congratulate themselves upon not having to painfully hammer out a spark with flint and steel in order to get a tallow dip alight, as their fathers were fain to do. But now, even the necessity for lighting the gas is voted a tax upon strength, time, and patience, and a positive drawback to the recommendations of gas. People will pay handsomely, more especially if they are not instantly reminded of the charge, to be saved the smallest trouble. It is through overlooking this element of the situation that professed economists are so often led to form wrong conclusions in regard to the turn of trades and public supply organizations. The economist is apt to overrate mere cheapness as an attraction in itself. All other things being equal, it is usually true that mankind will try to get the most they can for money; but, then, so few things are really of equal desirability, but different prices, that the rule becomes as idle in practice as the famous lesson of Buridan's Ass.

It was a reasonable doubt as to the willingness of the public to take any additional trouble about their lights—especially about gas, the chief recommendation of which was that it gave no trouble at all—which caused most gas engineers to look askance at the Welsbach light. That, and nothing else, was the origin of the indifference of the leaders of the gas industry in this country to the novelty, which was so grievously misunderstood by the Welsbach Company. We all know what was their idea on the subject, and how costly the mistake eventually proved. It is idle to inquire why, in the circumstances, British gas companies did not immediately rise to an appreciation of the right way of overcoming this objection to the Welsbach system. If the original Welsbach Directors went to their (financial) graves firmly persuaded of the incompatibility of their interest with that of gas suppliers, the latter might have believed as strongly that the public, who have never even in many instances arrived at an understanding of the gas-meter and its ways, would not take kindly to a burner of their recommending. Besides, in this country the Welsbach gas-burner was an expensive affair, and trafficking in it was surrounded with such difficulties that the most far-sighted of gas company administrators was easier persuaded that it was a thing to be left alone than to be unnecessarily meddled with.

In Germany, as all the world now knows, altogether different conditions prevailed. Not only was gas itself much dearer than in England—thus heightening the initial attraction of an economical means of obtaining light from it—but the Welsbach invention was marketed without any irritating restrictions or artificial enhancement of price. Therefore—not immediately, but after a sufficient period of probation which everything helped to shorten—the gas manufacturers not only saw that the method was likely to prove lastingly beneficial to their customers and to themselves, but also that it was subject to the one great drawback of giving additional trouble, already admitted. Naturally, as business men, they set about the removal of this obstacle to the universal popularity of the system; and the result is the "maintenance" arrangement as we now have it. What we are at present solicitous to make clear in this connection is the true magnitude of the new departure, in its essential quality of a concession to the universal sentiment of civilized humanity. It is no mere "fad" of a few enthusiasts for a particular method of popularizing gas, but of a piece with that overmastering tendency of sparing the community unnecessary trouble and labour, which has brought about the installation of lifts in places of business, and finds profit in halfpenny tram fares.

Even so, the gas manufacturer is beaten on the point of convenience by his electrical rival. The superiority which gas holds to oil, has been taken in its regard by the electric light. There is no sense in ignoring this patent fact, though, to judge by the insensate claim of electricians to cheapness for their light, one would imagine them to be bent on minimizing its strongest point, in order to attach themselves to its weakest. The cheapness of electric light, and the profit to be made out of supplying it even in the poorest districts, have been insisted upon by partisans of the light from Sir William Preece downwards, until one would imagine they half believe it themselves; while scarcely one of these advocates of the light of luxury has made enough of its real and incomparable advantage of convenience. Indeed, one of the main factors in this very consideration—the facility of turning on and off the electric light in a room from a switch beside the door—has been abused by electricians into an argument for its economy. It is stated to be such a "saving" to be able to turn on and off the light in this way! The fact being, that while those who can afford the light at all do not care a jot whether they can save little or much by this arrangement, they do appreciate very highly the advantage of being able to "light up" in so simple and handy a fashion. And so does every man, even though he be a gas engineer, who has occasion to use electrically lighted hotels when on his travels. It is quite common to find electric lighting superseded by incandescent gas in the public rooms of hotels, on account of the greater brilliancy and economy of the latter, while it is retained for the bedrooms for the sake of its convenience. It is a comfort not to have to fumble for the matches.

Such a division of patronage as this proves our point, and shows how much more carefully than of yore the practical problems of artificial lighting are now studied and solved. It would not have been within the power of the public of a past generation thus to balance brilliancy and price against convenience. It is its convenience, added, of course, to a touch of fashionableness, which keeps a market for electric lighting, notwithstanding the

demonstrable superiority of incandescent gas in brilliancy and price; and remembering what the same element once gained for gas in comparison with lamps, it does not lie in the mouths of gas engineers to complain of the change of fashion. If everybody could have the electric light to go to bed by, and switch on at need in the dead of night, everybody would use it for this purpose. But that such a line of custom alone would not pay the supplier is quite another story. We do not suppose it would. That, however, only exemplifies the short-sightedness of those who in this country would not let gas companies do whatever electric lighting their public required—like the Corporation of Leicester, for instance. If gas companies had been allowed a free hand in this matter, there would scarely have been one such undertaking in the land from which at the present time consumers could not have suited themselves with any proportion of either kind of light they might happen to fancy. The gas company would not have minded if the householder had asked for only two or three electric lamps for his bedrooms, using gas for the rest of the house. How does it stand now? All the ingenuity of the electrical profession is exhausted in inducing the consumer to use his lamps for the longest possible period of every evening—which is to make electricity look at its very worst beside gas. And even then the business does not often pay. A gas company would have supplied a consumer with electric light for half-an-hour, or an hour of an evening, for "upstairs" use, saying nothing about maximum demand indicators or any other vain device for making a costly luxury appear a cheap necessary. The gas company would probably charge the maximum rate for it, too; but seeing the limited and special character of the demand, that could not be an objection. And inasmuch as the supply would be provided by the engineman on night duty starting another machine, driven by gas or steam, it would be cheap enough to the company. It is almost a pity that, even as the law stands, an attempt to work a small combination of this kind has not been made. We say a "small" works advisedly; for no English gas company would care to burden themselves, to no advantage, with a branch business big enough to stand alone. It is only a question of such small districts as must go without the convenience of the electric light altogether, if it is not to be had from the gas-works.

WORKING OF THE EMPLOYERS' LIABILITY AND WORKMEN'S COMPENSATION ACTS IN 1901.

The Home Office has, somewhat earlier than usual, published its annual report upon the working of the Employers' Liability and the Workmen's Compensation Acts, containing all the statistical information which is available for the year 1901. This information relates to only a limited area of the vast field covered by the operations of the two Acts—there being no statutory obligation upon employers to make returns relating thereto. But the tables compiled by the Home Office from County Court returns, particulars of cases carried to the Supreme Courts, of official references to the Medical Referees, and as to mutual schemes under the Act of 1897, while not touching upon more than a very small percentage of the cases in which compensation is paid, afford a very useful basis whereon to form an idea of the benefits accruing to the working classes from the operation of the Workmen's Compensation Acts. The cases dealt with by the Home Office include, in fact (apart from those where memoranda of agreement are registered in the Courts, a plan only generally adopted in certain parts of the country), practically none except those where the claim for compensation is in dispute; and anyone who has practical knowledge of the working of the Acts knows in how very small a number of cases is the offer of the employer demurred to by the injured men. The present report is the first to include cases relating to agricultural labourers, to whom the benefits of the 1897 Act were extended in 1900 by an Act coming into force on July 1, 1901. As these cases amount to only 1 per cent. of the total, comparisons are not really affected by their inclusion in the 1901 returns.

The first table in the report shows the number of cases under the Workmen's Compensation Acts dealt with in England and Wales by County Court Judges and arbitrators appointed by those Courts. The number of such cases tends to increase; the totals for the past three years being: 1899, 999; 1900, 1145; and 1901, 1370. The last figure includes 11 cases in reference to agricultural labourers. The number of cases referred to arbitrators shows a rapid diminution; practically the whole being now dealt with by the Judges. The number so dealt with has increased from 828 and 1046 to 1289; while special arbitrators were called upon last year to deal with only 9 cases, compared with 29 in 1900 and 98 in 1899. In addition to the 1298 cases actually brought to a hearing, 72 were settled by the acceptance of the money paid into Court, while 548 were either withdrawn, settled out of Court, or otherwise disposed of in such a way that the result cannot be definitely stated by the Court officials. The total number of actions entered upon was, therefore, 1918, as compared with 1552 in 1900 and 1347 in 1899. The claims finally settled during 1901 within the cognizance of the Courts—apart from those recorded by memorandum of agreement—numbered 1174, of which 1007 (or 86 per cent.) were decided in favour of the applicant, and 167 in favour of the respondent. In the two previous years the percentage of applicants successful were: 1899, 75; 1900, 81; while, it is interesting to note, in the actions taken under the Employers' Liability Act, the percentage of claimants successful has steadily decreased, being only 61 in 1901 against 72 in 1897, before the Workmen's Compensation Act came into force.

Of the 1007 awards of compensation made, 399 took the form of lump sums, 301 of which were in respect of fatal accidents. In all these 301 cases, the deceased left dependants; and the total amount of compensation awarded amounted to £56,702, or an average of £188 7s. 7d., compared with £173 1s. 7d. in 1899, and £163 8s. 9d. in 1900. The higher average for last year is partly due to there being dependants in every case, but mainly, we take it, to the fact that the compensation awarded is based upon the deceased's earnings for the preceding two years; and it is common knowledge that from the middle of 1899 to the middle of 1900 was a period when exceptionally high rates of wages were being earned in the iron and coal trades. In the mining industry, as a matter of fact, the average compensation was £214, equal to earnings at over £2 per week for two years. With regard to the 98 awards of lump sums as compensation for injury, 42, averaging £50, were made in cases of total incapacity; and the remaining 56, averaging £18, were granted in respect of partial incapacitation. Weekly sums were awarded in 608 cases of injury—345 cases of total incapacity, with an average grant of 11s. 10d. per week, compared with 10s. 11d. in 1899, and 11s. 6d. in 1900; while in the remaining 263 cases (of partial incapacity), the award averaged 9s. 8d. per week, compared with 9s. 2d. and 10s. 9d.

The second table gives particulars as to the number of cases in which memoranda of agreements and informal arbitrations were registered in the County Court, an act which, it will be remembered, gives legal force to the terms of the agreements. The number of such registered memoranda—agreements 1623, arbitrations 13, total 1636—shows a considerable increase; the total for 1899 being 763, for 1900, 1253. But still it represents only a very small proportion of the agreements under the Act of 1897, it being apparently considered unnecessary in most cases to go to the trouble of putting in a memorandum for registration. The cases recorded by memoranda include 118 fatal accidents where dependants were left, the average award being £167 5s.; 2 deaths where no dependants were left, the statutory award of £10 being made; and 1516 cases of non-fatal injury, which it has been found impossible to classify into "total" and "partial incapacity." Where lump sums were granted, the average amount paid was £50 14s. (compared with £32 5s. paid for all cases adjudicated upon by the Courts); where weekly allowances were granted, the average payment made was 13s. 5d. (compared with 10s. 11d. awarded by the Courts). It would appear, therefore, that injured workmen get better terms on the whole when they settle with their employers by agreement than when they take their claims into Court, which is what would be expected by those who know how the majority of employers deal with such cases, but which many men cannot bring themselves to believe.

Table No. III. gives the figures relating to claims under the Employers' Liability Act, which are less complicated than those relating to the Workmen's Compensation Act by reason of all awards under the earlier Statute being by way of lump sums, and because all claims, other than those removed to the High Court, are settled by the County Court Judges—no arbitrators being appointed as under the 1897 Act. The number of actions brought in the County Courts last year under the 1880 Act was 590, as compared with 505 and 511 in 1899 and 1900, and with 688 and 681 in 1897 and 1898 (before the Workmen's Compensation Act was in full operation). The number and amount of awards made, however, show no increase over the two previous years, and a marked decrease from the 1897 and 1898 figures.

The "judgments for the plaintiff" compare as follows: 1897—220, damages awarded, £15,115; 1898—220, £16,853; and 1901—159, £11,295. The average amount of damages awarded in 1897-8 was £77; in 1901, £71. Of the total number of claims (590) last year, only 30 were in respect of fatal accidents. Settlements out of Court, withdrawals and adjournments *sine die*, accounted for 11; judgments for the defendants for another 10; while to the plaintiffs in the remaining 9 cases damages were awarded amounting to £808. As this represents an average of £89 15s., as compared with £188 7s. 7d. obtained by defendants proceeding under the Workmen's Compensation Act, the small number of actions taken under the earlier Act by representatives of the victims of fatal accidents is easily accounted for.

Of the 150 judgments given in favour of injured workmen suing under the Employers' Liability Act, 32 were in respect of total incapacitation, and the average award was £95. In the 118 cases of partial incapacitation, the damages awarded averaged £63. The solicitors' costs allowed in actions taken under the Act of 1897 amounted to £10 13s. 1d. per case; and under the Act of 1880, to £21 5s. per case. When it is remembered that in 39 cases out of every hundred under the 1880 Act the plaintiff loses the day, while only 19 per cent. fail who proceed under the 1897 Act, it will be seen that there is every inducement to the injured workman to claim compensation under the latter, rather than damages under the former. Notwithstanding this, there is a marked and growing tendency in London to sue for damages. In the Metropolitan Courts last year, there were 301 cases under the Employers' Liability Act, against 201 under the Workmen's

Compensation Act; whereas for the rest of England and Wales the figures were 289, against 1717. In the 301 actions referred to, the plaintiffs succeeded on only 68 occasions; in the 201, the plaintiffs succeeded on 98 occasions. It looks rather as if the Trade Union solicitors are more successful in persuading their clients to proceed by the more expensive method, than in winning those clients' cases for them.

Tables V. and VI. give particulars relating to cases carried into the Higher Courts. The number of cases under the Workmen's Compensation Act which were taken to the Court of Appeal in England in 1901 was 61, or little more than 3 per cent. of all the cases that came before the County Courts. This is a considerable decrease as compared with 1900, when the appeals numbered 90, or nearly 6 per cent. In Scotland, also, the number of appeals decreased last year from 32 to 23. Of the 61 English appeals, 22 were by workmen (6 successful), and 39 by employers (7 successful). For Scotland, the figures were: Appeals by workmen, 8, successful 3; appeals by employers 15, successful 6, There were only three appeals to the House of Lords (all by workmen); and of these, only one was actually carried to a hearing.

The list of Appeal cases which was given in the returns for 1899 and 1900 is continued in the present report, and professes to contain "a brief note showing the point in the Act on which the appeal arose." We can only repeat our criticism of the former list—namely, that, as drawn up, it is too brief and ambiguous to be of much value. For instance, this note upon an appeal conveys no information of any value whatever. Name of case—*Harwood v. Abrahams*; party appealing—applicant; result dismissed; point on which appeal turns—definition of the term "defendants" (sec. 7, sub-sec 2); reference to reported cases—"unreported." Apparently, Harwood was held not to be a dependant of the deceased workman; but what use is that inferred knowledge if we are not told what the relations between the two were? Brevity, we know, is the soul of wit; but as Home Office reports are not generally classified as humorous publications, it would be better if their compilers remembered that intelligibility is the soul of business communications. A *précis* of each case, such as is to be found at the head of each report in the "Law Times," would not add materially to the bulk of the return, and would make all the difference in its value.

In 86 out of the 87 appeals, the point at issue is stated (the odd one being withdrawn), including 18 cases involving two or more points in each. No less than 30 of the appeals turned upon the question of whether the workman's employment was one to which the Act applied—the only case decided by the House of Lords being upon that point, and we are merely told that the applicant was the appellant, and that the "order was reversed." The number of cases in which a reference was made to the Medical Referees under the Workmen's Compensation Act by Judges, committees, and arbitrators, was somewhat greater than in previous years, but still very small; the figures being: 1899, 31; 1900, 50; and 1901, 83. As there are 200 such referees in England, it will be seen that their duties are not onerous.

Particulars as to the working of "mutual schemes of compensation" under the 1897 Act will not be available till the publication of the annual report of the Registrar of Friendly Societies; but it may be noted that there are only some 50 such schemes in operation, affecting about 137,000 workmen. It is a matter for regret that this method of dealing with compensation for accidents has not been more generally adopted.

The following are the "general conclusions" to be drawn from the statistics contained in the Home Office report according to its compiler, Mr. C. E. Troup, C.B.:—

Speaking generally, a comparison of the returns for 1901 with those for the years 1899 and 1900 (the first two complete years when the Act was in force) does not show any great change in its operation. The number of appeals on questions of law has, however, diminished considerably—the figures for the three years are 54, 90, and 61—and there seems, therefore, reason to hope that progress has been made towards the definite settlement of the legal difficulties in the interpretation of the Act of 1897. In an Act dealing, as this Act does, with entirely new matter, the legal questions to be settled are necessarily very numerous; and in view of the enormous range of cases to which the Act applies, it is reasonable to suppose that the great majority of these difficulties would come up for decision in the earliest years of its operation. On the other hand, the number of cases brought to the County Courts—in most of which it must be questions of fact that are at issue—still tends to increase. The figures are, 1347, 1552, and 1918. But, even in view of this increase, the statement must be repeated that the cases which come before the County Courts do not represent more than a very small proportion of those in which compensation is paid under the Act. The great majority of claims are settled by agreement, and only a small percentage are made the subject of formal arbitration. In the case of deaths, where the claims are for comparatively large sums, we find, as in 1899 and 1900, that a good many are disputed. . . . Yet not more than 18 per cent. of the cases [of death by accident, all of which are reported] came in any way before the Courts; and this figure includes a good many cases finally settled out of Court and others in which the only question was the apportionment of the compensation among the dependants. In 1899, the proportion was 15 per cent.; and in 1900, 14 per cent. As regards claims for injury, though there are no official figures of the number of persons injured which are of any value in this connection, the statement may be repeated that the unofficial figures available in certain industries indicate clearly that the number of litigated cases is less than 1 per cent. of the number in which compensation is payable.

TRADE UNION TYRANNY AND THE PRESENT OUTLOOK IN SOUTH WALES.

Last week, when concluding an article (p. 393) dealing with the judgment in the "stop-day" case, in which the South Wales Coal Owners and the Miners' Federation were involved, it was remarked that the result of the recent trial "is not calculated to improve the prospects of peace in the Welsh coalfields"; and it is certainly impossible for those who have watched the course of events in the district during the past few months to shut their eyes to the fact that there is serious cause to fear a rupture between employers and employed within a measurable period of time. For the past three years—indeed, ever since the strike of 1898, which ended badly for the men—the relations between the two parties have been decidedly the reverse of cordial. This condition of things had its root in the junction of the South Wales Federation with the Miners' Federation of Great Britain after the strike. As a consequence of that junction, the employers have been obliged to remember that the representatives of their workmen with whom they have dealings, through the Sliding-Scale Committee, no longer represent only those workmen, and no longer have in view only the well-being of those men, but are in effect the officials of a "foreign" Trade Union, one of whose fundamental principles is hostility to the sliding-scale system of regulating wages. With this knowledge at the back of their minds, the employers have felt themselves prevented from placing the same friendly confidence in the men's leaders as they did in former days; while those leaders have given evidence of caring nothing for the interests of the employers so long as the supposed interests and ends of the Union were served.

This indifference to the convenience and interests of the coal owners has been most clearly shown by the Federation in the policy adopted regarding the presence of non-Unionists in the collieries—a policy which is doing more than anything else to render a breach of the peace inevitable. For some time past, the Federation have been forcing non-Unionists into the ranks by either setting the pits idle or threatening so to do—tactics which, we are told, have caused a rising sense of exasperation on the part of the employers. In our opinion, it is a great pity that the employers have so far not gone from exasperation to action. The organizers of such a policy feed upon, and are rendered more aggressive by, success; and the Federation is now undoubtedly suffering badly from the complaint known as "swelled head"—a complaint for which the only effective remedy is a severe one.

Of the "bossing" attitude of the Union towards the employers, and their tyrannical attitude towards non-Unionists, two instances have been recently afforded. Some three weeks ago, the men's representatives notified to the masters that they wished to take the 4th, 5th, and 6th inst. as holidays—a proposal to which the collieries would not assent, as such a course would seriously disorganize their business. So far from this reasonable objection having any weight with the men, it only seems to have added zest to the pleasure of the holidays; for, although the pits were open, the miners followed their own inclinations and were idle until the Thursday. This is how the Union makes manifest its "earnest" desire to work amicably with the employers. The following is an instance of how they act towards those miners who dare to offend the mighty Federation. At the Tredegar collieries the other day, one man was 3s. in arrear with his contributions; so 300 men refused to work on two days and 2400 men threw down their tools on the third. Not (according to the manager of the collieries) that the man was unwilling to pay up. He offered his contributions to the Pit Committee; but they declined to take the money, and "told him that, as a punishment for not paying the money on the previous Saturday, he would have to go home one day." The man declined to lose a day's pay; and, as the manager, when asked by the Union to do so, naturally refused to prevent the man working, he went to his stall. The Committee then demanded that he should be suspended from work for two days; and, the manager again refusing, they called out the men and said for every day they were out, the man who had been in arrear must lose two days, and a demand was actually made that he should be dismissed. Eventually, the man agreed to lose five days; and the miners then returned to work.

Comment upon such insolent tyranny and high-handed disregard of the interests of the employers is scarcely necessary. It seems probable that they will prove the last straws to break the back of the—in our opinion, ill-advised—patience of the employers with such tactics, which, as one manager puts it, "upset everything. All our arrangements are turned topsy-turvy, contracts are not completed, ships, horses, trucks are kept waiting, and there is a general breakdown all round"—because one man dares to be in arrear with his subscriptions to the Union! We are glad to see that the Tredegar Company are going to prosecute a selected number of the men concerned in the stoppages; but we are afraid that the head of the Union is too swelled for such action now to have any salutary effect. As the before-mentioned manager adds: "Employers made a great mistake in not putting their foot down when these games commenced." The fact is, the games commenced, as we noted at the time, when coal prices were so high that employers shut their eyes rather than shut their pits against

the men; and now they have the price to pay. At present 1500 men are out at the Abergorky colliery because about 60 members are in arrear; and at several other collieries notices have been tendered in order to compel miners to join the Federation.

The manly and generous attitude of the Union leaders towards non-Unionists may be gathered from a speech made by a certain John Williams, miners' agent, at the annual demonstration of the Rhymney Valley miners the other day. He said he had prepared a catechism dealing with the non-Unionist question, which began as follows: "The non-Unionist—who is he? Whence cometh he and whither goeth he? Who or what begat him? Is he a mammal or a parasite? Is he a blessing or a scourge to humanity? Has he a moral right to act detrimentally to the interests of others? If not, is it immoral to compel him to do that which is right?" This specimen of a freedom-loving citizen added that "the employers must be taught that the interests of the working community were not to be trifled with." To us, it seems rather that in South Wales the boot is on the other leg, and that it is the men who need teaching that the interests of their employers are deserving of some consideration.

With this spirit animating the men (a spirit that will not be modified by their success in the preliminary stage of the litigation over the stop-day policy), and with the owners rightly exasperated at the treatment they have received and are receiving at the hands of the Federation, it must be confessed that one cannot look forward with much hope to a peaceful conclusion to the negotiations which were opened last week between the two parties as to what scheme for regulating wages in the South Wales coal-fields shall be adopted in place of the sliding-scale agreement that comes to an end on the 31st of December next.

ELECTRIC LIGHTING MEMORANDA.

The Progress of High Voltage Lighting—Efficiency of the Lamps—The Need for Something to Stir up the Electric Lighting Business—The Question of Earthing the Return Conductor—The Cost of Electric Tramway Working.

THE subject of the economy of high voltage incandescent electric lamps is of considerable attraction for those engaged in the electric lighting business, especially where the plunge to a high-pressure supply has not been taken. In England this was done some time ago; and the resulting agitation has almost subsided. But in the United States the change has not yet been generally made. Where is the palm of progress to be awarded, in these circumstances? The question may well be asked, because of the curious way in which this ascription of progress is made by a particular cast of English public opinion. We have for years sought in vain for the principle on which the award is bestowed. Certain periodical publications are understood to be published in the interest of Progress; but it is by no means easy to understand what they mean by the term. We may flatter ourselves we have a clue to it in the lavish praising of foreign at the expense of native ways of doing things; but it is not safe to trust to this, because the foreign example is dropped like a hot potato the moment it threatens to go wrong, which is very frequently. At home, Progress is usually associated with the doings of a particular brand of politicians whose ideal is understood to be rates of 20s. in the pound. But here again the difficulty arises that this profession of faith is not always kept in the forefront. Most things that parish authorities do at the cost of advanced rates are Progressive; but private individuals and companies can be Progressive too—if they advertise themselves liberally enough. It is a puzzle.

To return, however, to the subject of high-voltage electricity distribution. Is this progress or not? Because if it is, it is almost an English speciality. Yet foreign suppliers of electricity are nibbling at it. American practice would willingly follow this British lead, but for the opposition of the fire insurance interest, which is very unprogressive. Germans manufacture more 220-volt lamps than they use themselves; and poor things they are, as a rule. They have an average life of 400 hours at most, and their efficiency is well below 4 volts per candle power. Seeing how roundly the "JOURNAL" has been abused by electrical contemporaries for presuming to take 4 volts per candle as the standard of duty of incandescent electric lamps, the information that German manufacturers cannot make high-voltage lamps even so good as this is distinctly refreshing. The extreme thinness of the carbons of lamps for these high voltages greatly increases their liability to breakage and rapid deterioration; and such lamps do best in the larger sizes of 32-candle power and upwards. Naturally, the question arises of where the interest of the consumer comes in, if his part in high-voltage supply consists in the obligation to use a short-lived 4½-volt lamp? He ought to get a discount in addition; but the amount of it is open to dispute.

Such questions as this belong to the category of industrial and business topics which latter-day electricians are being accused by their candid friends of entertaining a tendency to shun. The "Electrical Review" notices that all the papers presented at the last meeting of the Municipal Electrical Association were of a technical nature. This preoccupation with double-current generators, turbine engines, and other absorbing points of technic is well enough, provided that those who have to run the business do not entirely lose sight of the ordinary commercial wants and interests of the consuming public, "from which alone the demand originates, and through which it is maintained and developed." The only question of practical moment to the public mentioned on this occasion was that of "earthing," which appears to apply to the proposition to allow consumers to have uninsulated, or, to speak by the card, "earthed" returns for house wires. The point arises from the reflection that the distribution extensions which are now general do not pay. Moreover, it is at last avowed that, from the trading point of view, something ought to be done, and that immediately, to bring in more electric lighting business of a really profitable nature. The difficulty is that the cream of the possible business has usually been taken. The bulk of the demand for electric light at actual prices has in most places been booked; and the only field remaining to be covered is the mass of the public who cannot afford the normal expense of the service. It is confessed that the "free wiring" schemes introduced to facilitate new connections are not proving a permanent success, and some means must be found to really reduce the prime cost of wiring. On the other hand, the electric light fitter finds a difficulty in obtaining work at remunerative prices. Both work and profits are steadily decreasing; and the very existence of the trade is threatened. An aggravation of the depression from which the trade is suffering is to be seen in the uncertainty that prevails in regard to contract prices. There was published the other day a list of the tenders sent in for wiring some municipal buildings and a fire station. There were but 90 lights altogether, with 50 switches. The tenders ranged from £115 down to £28 for the job. The lowest tender was accepted. This is clearly no sort of way to get good work done, or to procure satisfaction for either party to the transaction. The suggestion now is that salvation might be found in doing away with insulated return wires, and simplifying the connection to a metallic pipe carrying inside it the insulated feeding conductor, which shall itself serve as the return uninsulated conductor—presumably to run to earth immediately outside the premises. A discussion on the practicability of the principle is called for, with regard to the adaptability of the plan to existing main cable and distributing systems. It should be an interesting discussion; for, so far as we can understand the subject, it is tantamount to leaving any number of possible points of leakage open to the mains, subject only to the integrity of the lamp switches. How far the unaccounted-for proportion of the station output would be affected, one would rather wait to see before saying.

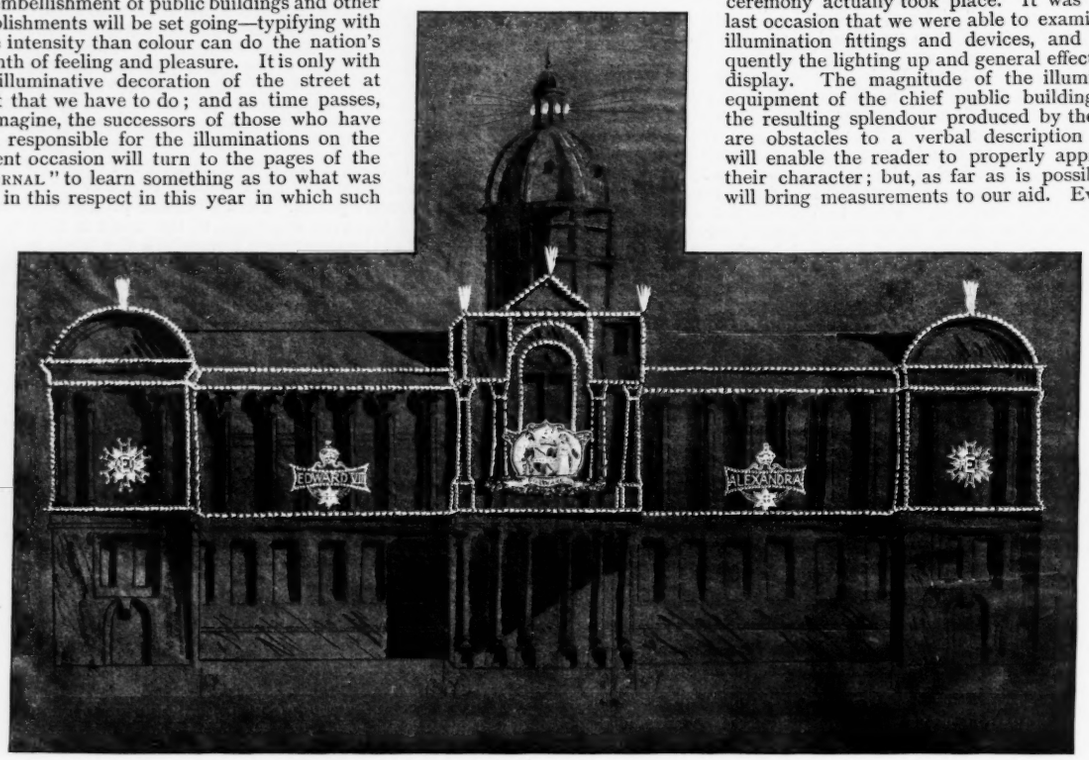
In June last, we applied this column on several occasions to registering the traffic statistics of certain municipal electrical tramways—to wit, Liverpool and Birmingham—with the object of showing that the extravagant prognostications of cheap working that had been indulged in by some self-appointed prophets of this kind of "Progress" were not always justified by the results. For doing this service to the cause of truth and soberness in regard to the matter, we were fiercely attacked by an electrical contemporary, which, not satisfied with pinning itself to the statement that an "almost universal" effect of the replacement of the horse-car by the trolley-car is a reduction of the expenditure to "below 50 per cent. of the receipts," went on to scout the examples we cited to the contrary, expressing thankfulness that the reputation of electric tramways does not depend upon what they do in Liverpool and Birmingham. Well, to return to the charge in our own justification, there is now to be added the experience of Glasgow, where the percentage of working expenses to gross receipts is 65·93. The average expenses per car-mile, including depreciation, were last year 7·71d. Let us hasten to admit that the report from which we quote states that "it would appear that the working expenses show a saving of 2d. per mile in favour of electricity." The comparison, however, is not quite convincing. There has been a large increase of the number of passengers carried, as well as of mileage run; and this growth of business, as we have always admitted, is to the credit of the electric haulage. The significant figures are the percentage of working expenses to gross receipts, and the cost of running per car-mile; and our point is that these turn out to be greatly in excess of the prophecies of five years ago.

A New Saturator.—Dr. Fryer, one of the District Inspectors under the Alkali, &c., Works Regulation Acts, mentions, in the course of his report to the Chief Inspector on his work during the past year, that Mr. T. S. Standfast, Manager of Messrs. Burt, Boulton, and Heywood's works near Southampton, has invented an ingenious form of saturator with a wrought-iron framework which can be taken away in sections for repairs. This enables the whole of the lead work to be seen while working. The present saturator is made of 20-lb. lead. It had been in use for some time when the report was made, and did not show any signs of buckling. Mr. Standfast coats the ironwork with a composition of his own, which prevents the action of the sulphuric acid on the iron. The saturator is of "piano" form; but Mr. Standfast's framework can be used for round or semi-round, as well as for closed or open, saturators.

ILLUMINATIONS OF A PROVINCIAL CITY.

Exemplary Devices and Useful Hints.

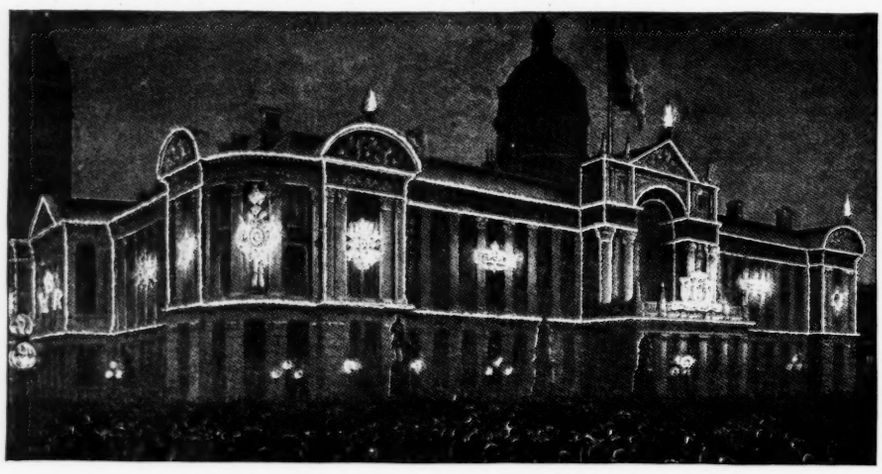
THE Coronation is over; and the whole country is thankful. But as men come and men go, so will great national events, which will in their turn lead to ebullitions of joy and thanksgiving after the manner of the display of gladsome feeling we have just witnessed. Then, again and again will all the paraphernalia of such occasions be brought into use. The streets will be adorned in the day with flags and bunting; and at night time the glittering embellishment of public buildings and other establishments will be set going—typifying with more intensity than colour can do the nation's warmth of feeling and pleasure. It is only with the illuminative decoration of the street at night that we have to do; and as time passes, we imagine, the successors of those who have been responsible for the illuminations on the present occasion will turn to the pages of the "JOURNAL" to learn something as to what was done in this respect in this year in which such important chapters have been added to the country's history. Already we have written of the illuminations in London, and two of the best examples of gas decoration have been illustrated in our pages. But so far little has been said of what has been done in the Provinces. Even an attempt to notice with any degree of faithfulness all of the best that has been accomplished in the country would be impossible; and therefore we have chosen for description and illustration the work that was carried out under municipal auspices in Birmingham. To the extent that travels have permitted us to see, or so far as we have been able to gather from the newspaper reports, the gas illumination achievement in Birmingham must be pronounced as being the example *par excellence* in the Provinces. Indeed, we will go further, and say that within an area of (roughly measured) 500 ft. by 300 ft., we have not seen any building illumination scheme, even in London, that would take one's fancy as did the illumination of the group of buildings comprising the beautiful Council House and Town Hall of Birmingham. They were illuminated on the nights of the holidays in June which were ordained to celebrate the Coronation, and again on the 9th inst., when the great ceremony actually took place. It was on the last occasion that we were able to examine the illumination fittings and devices, and subsequently the lighting up and general effect of the display. The magnitude of the illuminative equipment of the chief public buildings and the resulting splendour produced by the work are obstacles to a verbal description which will enable the reader to properly appreciate their character; but, as far as is possible, we will bring measurements to our aid. Even the illustrations do not impart what the eye was able to comprehend in one glance at the actual illumination.



FRONT VIEW OF COUNCIL HOUSE (FROM WORKING DRAWING).

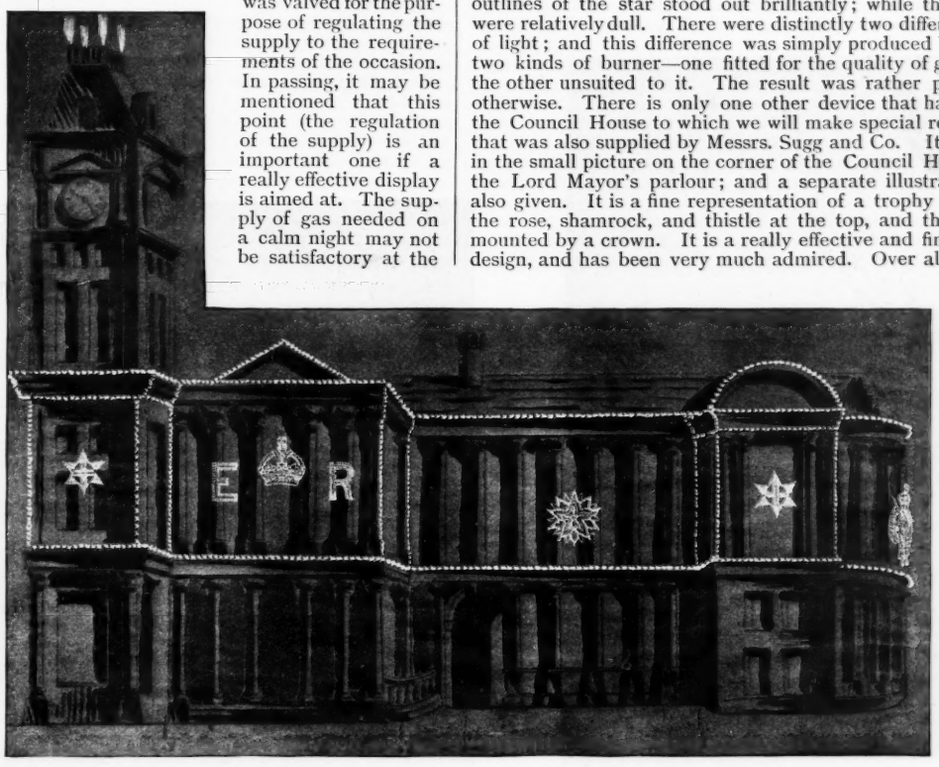
Here, before proceeding, we must give honour where honour is due, and say that it is largely to the interest taken in the work by the Secretary of the Corporation Gas Department (Mr. G. Hampton Barber) and to the exertions, plans, and personal supervision of the Fittings Superintendent (Mr. S. R. Barrett, Assoc.M.Inst.C.E.) that Birmingham owes the magnificent displays on the public buildings, which, we believe, set the city in this respect in the forefront of all provincial centres.

In dealing with the illuminations, it will be advisable to take the buildings individually, and to commence with the Council House. The front side facing Victoria Square, and the western side facing the Chamberlain Memorial and the Town Hall, were the only ones which could be usefully treated, as the northern and eastern sides face on to streets which are comparatively narrow, and so inadequate to the purpose of public display and sight-seeing. The Council House has a frontage of about 300 feet, and a depth of about 210 feet. The fabric being composed entirely of stone, the whole of the piping had to be self-supporting; and as a specimen of fitting work on a large scale, it could not possibly be exceeded in point of good workmanship. Viewing the installation from many places, the mass of piping—commencing with the 4-inch and 6-inch services (of which there were five of the former size and one of the latter), and ending with the 1-inch outlining tubing, fitted



PHOTOGRAPH OF COUNCIL HOUSE ILLUMINATED.

with star-jet burners spaced 3 inches apart—the quantity of the material used, and the appearance of solidity and permanence of the work (with nothing having the semblance of a makeshift about it) were features which excited at once wonder and pleasure. The piping all stood well away from the buildings, so that the gas-jets could not scorch or injure the stonework in any way; and every principal upright feeding the network of tubing or the devices was valved for the purpose of regulating the supply to the requirements of the occasion. In passing, it may be mentioned that this point (the regulation of the supply) is an important one if a really effective display is aimed at. The supply of gas needed on a calm night may not be satisfactory at the time of wind and rain; and any devices or ranges of jets that are sheltered from the wind or rain one night may be exposed the next to one or both of these elemental disturbances, and an increased gas supply may be necessary. Therefore, each and every part of the illumination work of a building must, to get the best effect at different times with changing conditions, be under immediate hand control. The staff, too, should be well marshalled, and every man made responsible (as was done at Birmingham) for some part of the work. This is a good hint, as a man will naturally keep an eye on every detail of his own section of work in order to present to the public gaze the best that can be got out of it.

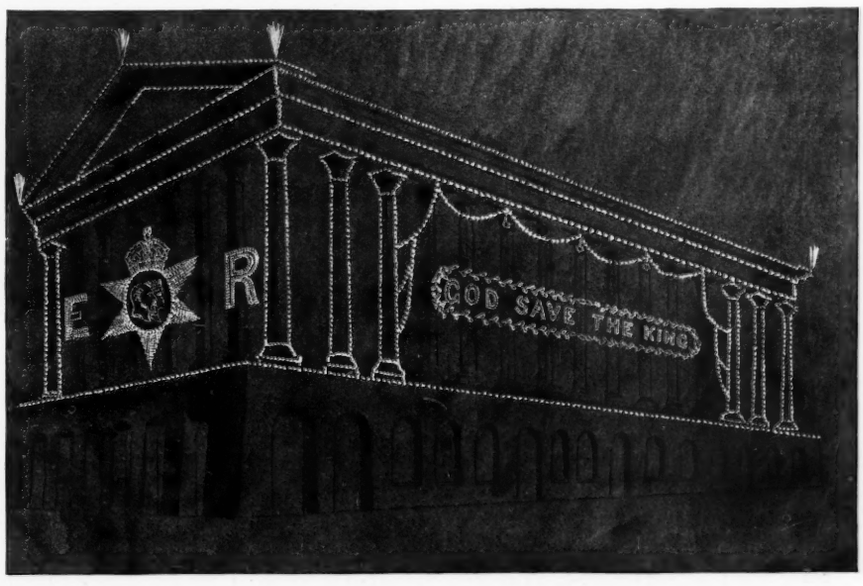


Western Side of Council House (from Working Drawing).

As the illustrations show, the upper part of the splendid municipal edifice was outlined with star gas-jets, and the portico and all other protruding parts were specially treated by similar means—each burner being drilled so as to give five distinct jets. The great central device over the portico at the front of the building is in itself really a work of art. It is composed of cut crystals, of various colours, and is modelled in high relief. It represents the city coat of arms, and is 22 feet long and about 10 feet high—the figures being about 6 feet high.

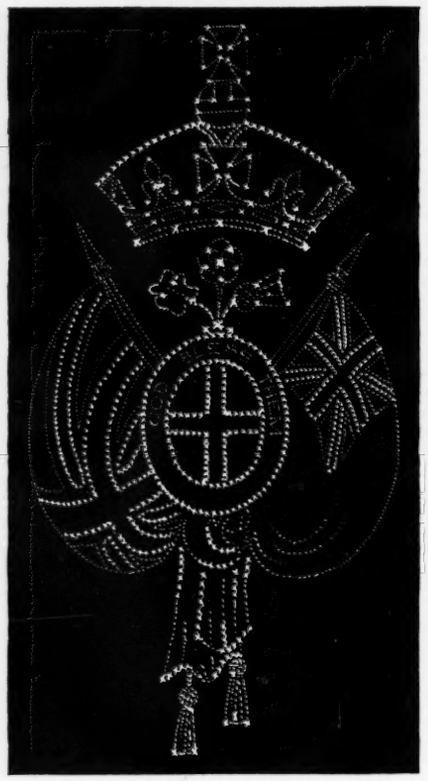
The greater number of the devices on the Council House were of the open gas-jet order (made by Messrs. Messenger, of Birmingham), and really splendid pieces they have turned out. Two other striking devices of the same character were supplied by Messrs. William Sugg and Co. One is the flame star on the portion of the building known as the Art Gallery. Looking at the drawing of the western side, it will be seen between the Brunswick star on the right-hand side and the letters E. R. and crown on the left. (Parenthetically it should be mentioned that in the large pictures, which are taken from the working drawings, the devices are shown in lower positions than they were subsequently fixed in; but the small photograph gives a correct representation of their location.) But reverting to the star supplied by Messrs. Sugg. To the gas man, there is a point of interest about it, inasmuch as in use it illustrated the difference of light and effect obtained by good and bad burners. The main outlines of the star stood out brilliantly; while the inner parts were relatively dull. There were distinctly two different qualities of light; and this difference was simply produced by the use of two kinds of burner—one fitted for the quality of gas used, and the other unsuited to it. The result was rather pleasing than otherwise. There is only one other device that had a place on the Council House to which we will make special reference, and that was also supplied by Messrs. Sugg and Co. It will be seen in the small picture on the corner of the Council House, outside the Lord Mayor's parlour; and a separate illustration of it is also given. It is a fine representation of a trophy of flags, with the rose, shamrock, and thistle at the top, and the whole surmounted by a crown. It is a really effective and finely executed design, and has been very much admired. Over all, it is about 26 feet in length. In addition to the outlining work and devices, on the three highest points of the front of the Council House were three gas-flares, as shown in the small view.

At the summit of the clock tower, there were also four large gas-flares. They were between 7 and 8 feet long; but from the ground level (the distance between being 140 or 150 feet) they did not appear to be more than 2 feet in length. The light from them (calculated at about 24,000 candles) was so intense that it illumined the sky for a great distance around; and miles away in the surrounding country they could be seen with remarkable clearness. The problem of how to get the large volume of gas



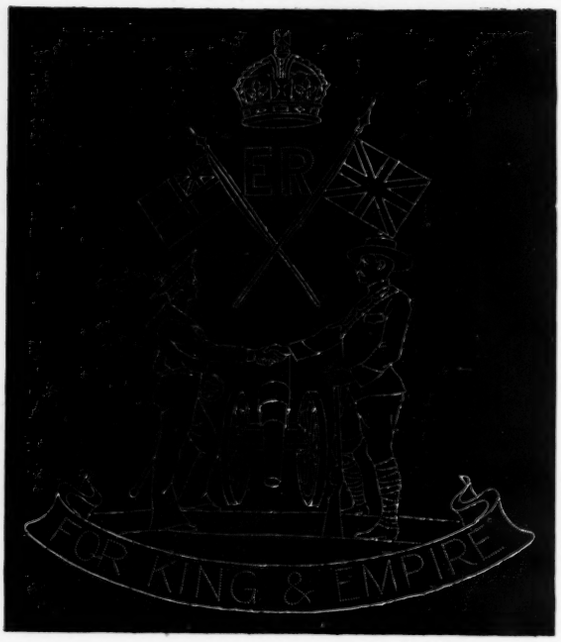
Front and Side of Town Hall (from Working Drawing.)

required by them to so great a height, without the risk and expense of running the large pipes necessary over an extent of glass roofs and up the tower, was solved in an ingenious manner. A silk hose of similar material to that used in the manufacture of balloons was successfully adopted; and the junction of this hose with a gas stand-pipe in the quadrangle of the Corporation buildings and with the flares at the top of the tower was effected, as needed, in a very short time by two men. This hose has been in use since June last; and examining it on the night of the 9th inst., we failed to detect the slightest leakage from it, or trace the faintest smell of gas. Knowledge of this successful application of silken hose to the conveyance of gas, at short notice and with absolute safety, to great heights may be useful to many readers; and possibly the service of such hose for the transmission of gas may be extended in other directions.



Trophy of Flags on Council House. (Sugg.)

Now we have to describe the illuminations of the Town Hall, which as visitors to Birmingham know, and our illustration shows, is a building of classic design; and its architectural features lent themselves to simple treatment with effective and beautiful results. It has a frontage of about 110 feet, and is something like 200 feet long. The reference to the piping of the Council House also applies to the Town Hall, with the exception that here seven 4-inch services were required. The piping was all self-supporting, and independent of the building, which is composed of Anglesey marble, and therefore offered no opportunity for attachment anywhere. By the way, it was noticed here and at the Council House that, although the piping was of large dimensions and ran here, there, and in all directions, it was practically invisible from the street level against the dingy stonework, which shows how well on such buildings pipes can conceal themselves without any special effort being made. However, a description of the Town Hall illuminations is an easy matter. The front, the back, and the side of the building facing Victoria Square were all treated upwards from the top of the base, around which ran a line of star jets. The principal columns and the entablature were also outlined in similar manner. The side was treated so as to form a draped proscenium, within which was placed the sentiment "God Save the King," in a framing of laurel leaves. This, as the picture portrays, was a really grand piece of fire work. The device is 100 feet in length; and the letters 4 feet in depth. The centre device on the front of the building facing Paradise Street is also an exquisite piece of work. It is in the form of a star, enclosing profile portraits of the King and Queen; the whole being surmounted by a Tudor crown. It was made by Messengers; and some idea of its size will be gained when we state that it is 26 feet in diameter; and the King's head from the forehead to the chin is 8 feet. This large device was flanked on either side by the letters E. R., which are 8 feet in depth, and composed of four lines of gas-jets. The back of the Hall overlooking the Chamberlain Memorial and Edmund Street was similarly treated to the front in respect of the outlining work. Centred in this was a beautiful gas-jet device, consisting of a laurel wreath containing the letters E. A. On the roof at each end of the hall were three flares of 2000-candle power. Also facing the Chamberlain Memorial, the fronts of the Free Libraries and the University were illuminated by handsome devices—the former by a Royal Crown, 8 feet in diameter, and two large Brunswick stars, and the latter by portraits of the King and Queen, the letters E. R., and other ornamental devices.



Fire Brigade Station Device (Milne and Son).

Victoria Law Courts Device (Milne and Son).

Taking the Council House and the Town Hall together, the gas-jets numbered but little less than 280,000; and it is estimated that the total light given by this huge collection of jets was in excess of a million candles. What this meant within the area occupied by the buildings decorated can only be appreciated by those who witnessed the sight. The field of vision from all points of vantage was truly one of indescribable splendour.

Coming to other public buildings, it was found that the Victoria Courts and the Fire Brigade Station had been fitted with gas-jet devices of superlative beauty; and on inquiry it was found that they were the productions of Messrs. Milne and Son, Limited. Of them, from the artistic and other points of view, we cannot

speak too highly; and, during the times they were alight, they attracted admiring crowds. The device at the Victoria Courts embrace several good features. At the base is a Brunswick star, which forms the centrepiece of a graceful drapery of flame, the ends of which are carried through and depend from two rings. Above this are fixed the letters E. R.; these being of massive design. The finishing feature is a Tudor crown, which is situated centrally with, but a little higher than, the letters. This crown is an exceedingly fine piece of workmanship; and it is modelled (as are all the other Tudor crowns which were used in the Corporation illuminations) from the design specially issued by the King's authority. The greatest width of the device is 27 feet, the crown is 8 feet in depth, the letters 6 feet, and the star 6 feet. This huge device was supported over the main entrance to the elaborate buildings by a scaffolding formed entirely by the pipes supplying the gas. To the Fire Brigade station, Messrs. Milne and Son also supplied devices, the largest of which was worthy of a more prominent position, and would have had had circumstances permitted. It is (as will be seen from the illustration) pictorial in character; and we regret that novel designs of this kind were not used with greater freedom in the schemes of decoration throughout the country. This particular device occupied nearly the whole depth of the upper part of the building, excluding the ground floor—its height being 28 feet. The firm also furnished the devices for other illumination work in the city—a notable example being the Exchange, where were fixed in a setting of star jets a fine Tudor crown flanked by the letters E.R.

The extensive Market Hall was also illuminated at either end by star gas-jet work and flares, with a pair of large Brunswick stars, which, it is interesting to mention, were first brought into service forty years since, and have only needed a little repair to fit them for the present celebrations.

Now we have come to the end of this account of the features of the main illuminative decoration work in Birmingham; and a few general notes and impressions gathered on the night of Coronation Day in that city may be given as a concluding paragraph. A careful study of the various systems of illumination in the streets (with the advantage of having seen previously and since much of the illumination work in London) has hardened our preference for the naked gas-jet illuminations above all other forms in use. In comparison, the electrical illuminations, while bright, were stiff and lifeless; and where electricity was used for worded devices (particularly when different coloured bulbs were employed), the result was an indistinctness, excepting in those on a very large scale, which really rendered a close view necessary to ascertain the nature of the sentiment. The former part of this criticism applies also to the gas-jet-and-coloured-glass form of illumination. It is pretty by way of variation; but there is not the brilliance and animation about it that is secured by naked gas-jets. Besides which, in device work the former does not give the latitude of the latter for the filling in of needful detail.

This is equally true of electrical work. Another point in favour of the open gas-jet form as compared with the glass enclosed jet is the rapidity with which a large area of lighting can be accomplished. Standing on the portico of the Council House at Birmingham just before nine o'clock at night last Saturday week, the scene was an interesting one. A large crowd were waiting expectantly in Victoria Square, which fine open space the incandescent gas-lights in the public lamps were beautifully illuminating. The upper parts of the huge buildings forming the background—the Council House and the Town Hall—looked dense and black; their noble features being entirely lost in the gloom. But as the clock in the tower struck the hour, lights were applied to the foot of each ascending gas-pipe; and in no more time than it takes to state the fact in writing, the flames ran along the pipes, and nearly the whole of the 280,000 jets had combined to fill the large square with a captivating lustre. Even the incandescent gas-lights in the lamps were entirely lost in the great radiance. For a few minutes here and there were little blank patches in the stretches of jets; but these were only caused by the cushioning of the air in the pipes. This, however, was quickly squeezed out by the inflowing gas; and the lighting was completed. One other point about this open gas-jet form of lighting which should be noted is that, to obtain the best effect, the feeding-pipes should be of ample dimensions and valved for regulating the supply, and the gas-jets should not be too diminutive if brilliance is desired. The size of holes drilled in the copper tubes of these devices was No. 20 B.W.G. Smaller holes were found to be unsatisfactory. Some of the business establishments in the city fitted with devices in which insufficient provision had been made in the first and last respects did not, for these simple reasons, look nearly so brilliantly lighted as they would otherwise have done. This is a point that manufacturers should note for future use.

The experiences derived from this excellent example of illumination work in Birmingham which we have taken some trouble to collect, will, it is hoped, be of service to readers in the future. It only remains for us first to thank the authorities for affording special facilities for gleaning so much that is of interest about the work described, and secondly to compliment them upon the generous manner in which they manifested their loyalty, and subscribed to the delight of the people of Birmingham and the neighbourhood during this season of their and the Nation's rejoicing.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see p. 513.)

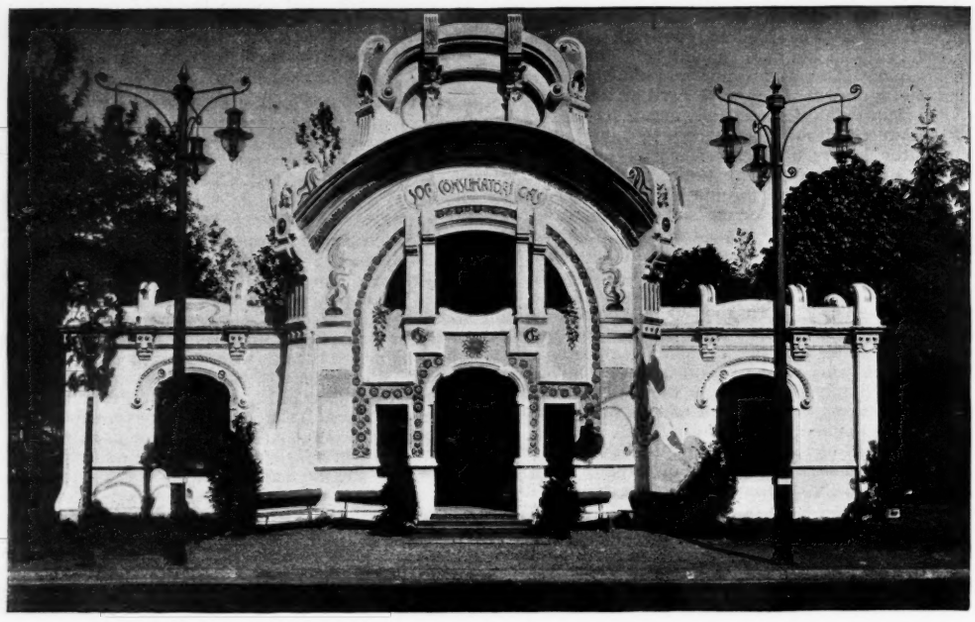
It is a long lane that has no turning; and the course that business in Throgmorton Street has so long been following took a turn last week. Markets opened very quiet, for a good many regular attendants were away; and, when the settlement began, much apprehension was felt regarding the outcome of it. Forced liquidations of accounts caused considerable flatness; but soon it happily transpired that arrangements had been effected to avert the impending crash from some heads which had been looked upon as doomed. The relief thus afforded imparted a degree of cheerfulness which had long been a stranger; and so the week closed a good deal brighter, and prices for the most part showed an advance on opening figures. The Money Market was strong; there being an excellent demand both in connection with the Stock Exchange settlement, and for other purposes. Business in the Gas Market was very restricted all through the week, and on some days almost next to nothing was done. There were hardly any changes in quotation, except those arising from *ex div.* adjustments. These appear to have been rather roughly knocked off; and, on the face of them, there is the suggestion of much irregularity between issues identical in interest. But in the absence of actual business, they were probably regarded as being near enough to the mark until the stocks should be actually inquired for. In Gaslight and Coke issues, the ordinary was moderately dealt in at very even figures. Opening at 92¼, it touched 93 on Tuesday, and closed on Saturday at 90 *ex div.*, which would be equivalent to 92 with the dividend in it. Dealings in the secured issues were rather more abundant, and prices were good, especially for the maximum stock. South Metropolitan was quiet, but very firm; and prices improved a bit after the general meeting on Wednesday. More than once 125 *ex div.* was marked, which is equivalent to an advance of about a point-and-a-hnlf. Only a couple of transactions in Commercial new were recorded. Business in the Suburban and Provincial undertakings was very quiet. A bargain in Alliance and Dublin at a cheap rate knocked half-a-point off the quotation; but the general tendency was firm —their accounts for the half year showing a prosperous state of things in general. Newcastle is the latest addition to the list of companies declaring an improved dividend. This Company is quoted *ex div.* on its local Exchange, and *cum div.* in Capel Court —an anomalous state of things which we commend to the consideration of the authorities. Liverpool "B" is a point easier locally; but Southampton debenture is higher. Transactions in the Continental Companies were limited, but prices were good, especially for Imperial, although the old quotation was still left standing without any advance. The undertakings in the remoter parts of the world were devoid of feature. In the Water Companies, there was really some little life after their long stagnation, and quotations moved, though irregularly. Lambeth and New River had to recede; while Southwark made a slight advance.

The daily operations were almost at a dead level each day in point both of volume and of price. Alliance and Dublin fell ½ on Tuesday; and South Metropolitan rose 1 on Wednesday. On Thursday, many *ex div.* changes were noted. Southampton debenture gained 2. In Water, Southwark improved 1. On Friday, Southwark rose 1 more; but Lambeth fell 5.

Mr. T. H. D. Berridge, who has been selected as Liberal candidate for Warwick and Leamington, is a cousin of Mr. T. Berridge, the Engineer and Secretary of the Leamington Priors Gas Company. He was a member of the firm of Messrs. Burn and Berridge, Solicitors, of Old Broad Street, and has always taken great interest in politics, though he has been too busy a man to figure as a candidate in a contested election. He has, however, had experience of public work, having been for some years on one of the London Boards of Works; and he is a Churchwarden of St. George's, Bloomsbury. He takes a very hopeful view of the prospects of Liberalism.

The Metric System.—According to the New York correspondent of the "Daily Telegraph," enthusiastic endorsement is given by the officials at Washington to the recent action of the Colonial Conference in London in adopting resolutions making the metric system of weights and measures compulsory throughout the Empire. He points out that the adoption of the metric system has been advocated by the Treasury Department for years, and in many congresses it has been a subject of consideration. At no time previous to the last session of Congress, however, was the matter taken up with so good a prospect of success as last winter. The Bill was favourably reported to the House, and is now on the calendar. It provides that the system shall be used exclusively by Government Departments after Jan. 1, 1904; and four years later it is to be made the standard system of the country. Particular stress was laid on the joint action of the United States and Great Britain in this matter, and a great mass of testimony was taken before the House Committee on Coinage, Weights and Measures, both from Government officials and American manufacturers. The evidence was nearly all in favour of the adoption of the system; and all witnesses made the prediction that should the United States act first, England would follow.

HIGH-PRESSURE GAS LIGHTING AT THE TURIN EXHIBITION.



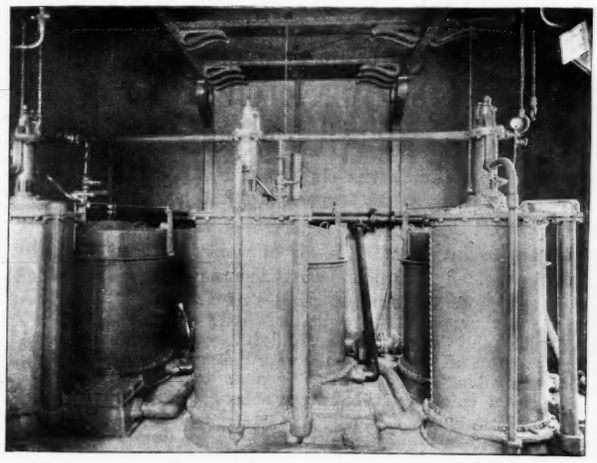
Exterior of Compressor-House, with two of the Lamp Columns in Foreground.

The lighting of large parts of the Art Exhibition at Turin by the Keith high-pressure gas system is one of the attractions of the place; and it has called forth the admiration of the local Press and of numbers of the visitors. The praise that has been publicly bestowed upon the lighting has given—and very naturally—the utmost gratification to the James Keith and Blackman Company, Limited, the owners and manufacturers of the system and plant. Before giving particulars of the lighting itself, there is something to be said about the illustrations. Two of them are photographs of the building in which are situated the Keith gas compressors employed in connection with the system. The house, it will be observed, is a highly ornate structure. Its external appearance is such that it is bound to entice the wayfarer to step inside, and see what is there on view; and the interior is of an equally pleasing character. Without doubt at most exhibitions abroad they are wiser in respect to such matters as these than we are. Where they endeavour to make even such things as gas compressors objects of interest, by giving them a picturesque and inviting habitation, we in this country would, in nine cases out of ten, place them in buildings which would incline the visitor to suppose that the contents—being considered by the authorities as unworthy of better treatment—were quite beneath a stranger's notice. Compare, for example, the shed that sheltered the Keith compressors at the Glasgow Exhibition with the handsome and tastefully decorated building that the accompanying photographs present to us, and then ask which is more likely to arouse the greatest interest in the methods adopted in the high-pressure gas system—the shanty at Glasgow, or the specially-built pavilion at Turin. There can only be one answer. We may certainly take a pattern from our friends abroad in this matter of courting the attention of the public at exhibitions to unattractive forms of useful plant or goods by giving it and them tasteful accommodation. The expense incurred in a reasonable amount of outside display is not money misspent when asking the public to pass a little time in examining gas apparatus and appliances—the larger part of which has no claim in itself to artistic merit.

The installation of the Keith high-pressure lamps in the Exhibition is a large one. In all it consists of 180 clusters of three burners each, making a total of 540 burners, with an aggregate illuminating power of 180,000 candles. The paths along the lake in the grounds contain the greater number of the lamps, two of which will be seen in the view of the exterior of the compressor-house. From each column are suspended three lamps, containing in all nine burners; and, from what has been seen of the lights in this country, we have no doubt as to the veracity of the eulogistic references in the local Press to the magnificence of the illumination. "La Stampa," for instance, speaks of the lights as having helped to "convert the poetic park into an enchanting garden." This is very prettily put; but the meaning is clear. The lamp columns appear from the photographs to be of considerable height. The ordinary lamp-post shown on the left-hand side of the first picture gives an indication of the actual elevation of the lamps; and this must be necessary, as otherwise the intensity of the lights would be distressing to promenaders in the beautiful main avenue (in which the compressor-house is situated) running from the entrance gates to the Exhibition buildings. Besides which, the height of the lamps enables the light to be diffused over a greater area of the grounds.

Interior of Compressor-House.

The picturesque interior view of the house is also very interesting. The compressors, it will be seen, are placed in an apartment simply guarded by a light gate of ornamental iron-work. The compressors, their connections, and fittings are shown complete in the third photograph. The plant consists of three No. 4 Keith compressors, which are a size smaller than those used for the high-pressure lighting at the Glasgow Exhibition. Each compressor is capable of supplying 2500 cubic feet of gas an hour at 8 inches pressure. The amount of water consumed by the machines is very moderate, amounting to only 89 gallons per 1000 cubic feet of gas. This is the only cost incurred in compressing the gas, and a simple calculation will show that it works out to a very small figure. Two compressors can easily do the work required; the third being merely held in reserve. The actual



THE COMPRESSORS AND CONNECTIONS.

consumption of gas to obtain the illuminating power mentioned from the 540 burners is only 1800 cubic feet per hour.

The whole of the work was carried out by the Societa Anonima Consumatori Gaz Luce, of Turin; and, as already intimated, the apparatus was manufactured by the James Keith and Blackman Company, Limited. As stated in the "JOURNAL" a short time since, the Turin Gas Company have also fitted up the Victor Emanuel Theatre with the same system, which has, through these large and successful demonstrations of power and efficiency, quickly gained popularity among the people of Italy. A congress of Italian gas engineers had been arranged for the end of last month in Turin, for the purpose of Examining and discussing, among other matters, the lighting of the Exhibition; but the engagement has been postponed for the present. We may therefore expect to hear something of their opinions or the system at a later date. It should be mentioned that the parts of the Exhibition not lighted by the high-pressure system are illuminated by electric arc lamps; but, says "La Stampa," "the large com-compressed-gas lamps . . . appear as if they would eclipse the electric arc lamps." It is gratifying to get testimony of the merits of the high-pressure gas lighting from an independent source such as this.

OBITUARY.

The death occurred rather suddenly on the 8th inst., at the residence of his brother-in-law, in Edinburgh, of Mr. JOHN LYON PURVES, late of the firm of Messrs. Sawer and Purves, of Manchester. Deceased was for some years with Messrs. Alder and Mackay; but in 1888, joined Mr. Sawer, and continued the business formerly carried on by Messrs. Fletcher and Murphy. Under their management it was very prosperous, more especially after the introduction of prepayment meters; but deceased relinquished active connection with it on its acquisition by Meters Limited, about four years ago. Mr. Purves was in his 55th year.

The news of the death of Mr. CHARLES H. BELOE, M.Inst.C.E., a well-known civil engineer of Liverpool, and for many years a member of the City Council, which took place at Llandudno early last Wednesday morning, was received with general regret in the city later in the day. He commenced practice in 1868, and carried out a number of water and sewerage works all over the country. His father was for a long time Chairman of the Water Committee of the Liverpool Corporation, and he himself was a member of that body.

A large number of our readers will learn with sincere sorrow of the great loss that has been sustained by their aged friend, Mr. GEORGE TAYLOR MYERS, formerly of Broughty Ferry, through the sudden death last Tuesday morning of his youngest daughter, Isabella. In his retirement, Mr. Myers has made his home with his daughter at the house of Mr. Gilbert Little at Smethwick, who many years ago was greatly indebted to the late much esteemed Mrs. Myers, and has since been like a son to Mr. Myers and a brother among the members of the family. A deep affection existed between the father and daughter, and the latter has been constant in her ministrations to his comfort during these years of rest. The separation is a painful one; and the keenest sympathy of numerous friends will be felt for Mr. Myers—in fact, we learn that already numerous letters of condolence have been received by him from gas managers in all parts of England and Scotland. The deceased lady was very highly esteemed in Smethwick; and at the interment last Friday—in addition to Mr. J. Napier Myers, Mr. C. P. Myers, Mr. Gilbert Little, and his sons (Mr. Matthew and Mr. Archie Little)—there was a large attendance of the leading inhabitants, including the Mayor (Alderman Smith, J.P.).

NOTES.

Experiments on the Heat of Gas-Engine Cylinders.

Herr E. Körting has recently made experiments with a view to ascertaining the expansion of the working cylinder of a gas-engine in an axial direction, as compared with that of the surrounding water-jacket. With a 400-horse power double-acting two-cycle engine, no difference of importance in the expansion of mantle and cylinder was observed. The results of the researches are reported fully in the "Zeitschrift des Vereins Deutscher Ingenieure," 1902, No. 4.

Sand Bricks.

According to the "Schweizeriche Bauzeitung," Herr Schwarz, a chemist of Zurich, has improved the system of manufacturing sand bricks by subjecting the materials to a special treatment before moulding. The lime and sand are mixed in a paddle pug mill, heated by a steam jacket. The inlet of water and air can be regulated so that much less lime is required (2 to 6 instead of 6 to 10 per cent.) and less powerful presses are needed for moulding. At the Industrial Exhibition in Dresden there was a model sand-brick works on the Schwarz system for an annual production of 6 million bricks. The plant is distinguished by simplicity, not only on account of the reduced number of mixing-machines (one being sufficient), but also of the absence of conveyors, hoists, &c. There are three moulding-machines, with adjuncts, each equal to the production of from 800 to 1100 bricks (10 in. × 5 in. × 2½ in.) per hour—viz., 30,000 per day of eleven hours for the three. The cost price per 1000 bricks, including interest and repayment of capital, is 15 frs. (12s. 6d.).

Depreciation of Coal and Coke in Transport.

A report by Mr. Stelkens, of Ruhrort, on the depreciation of coal and coke by shipment was presented to the recent International Navigation Conference at Düsseldorf. It was based, of course, on the German kinds of coal and coke; but some of the statements are of general interest. Westphalian gas coals show from 40 to 50 per cent. of slack at the colliery screening places. In transport by rail, lumps suffer the most crumbling, and washed nuts suffer more than through-and-through coal, which is very full of slack. Naturally, the farther the coal is sent and the more it is handled the greater the waste in the form of small; so that the cost of the coal to the consumer is largely affected by the value that can be obtained for the screenings on the spot. Transshipments, of course, increase the loss; so that sometimes it pays better to send coal all the way by rail, if possible, rather than combine rail and water transport. Some experts do not allow that any appreciable increase of the proportion of slack is made by the jolting and rubbing of the pieces of coal during a railway journey; but others allow for 2 per cent., to include breakage in loading and unloading. German collieries usually allow an excess weight of 2 per cent., which covers this loss. It is suggested that the avoidance of breaking should be kept in view in the designing of coal-handling machinery. There should be a possibility of vertically adjusting of coal-tips, so as to enable them to tip from a constant height, which should never exceed what is absolutely necessary. As regards liability to spontaneous ignition, coal heaps are never made higher than 5 metres, if it can be avoided. Warm rain during and after heaping, and compression caused by dumping the coal down from great heights, add to the danger of fire. Some enormous coal-silos have lately been built at Hamburg, Roubaix, and Copenhagen, which discharge from the bottom. Experience with these shows that the limitation of height of storage does not apply, because the whole mass of coal is frequently set in motion by the bottom discharging. No determination is offered of the rate at which coke depreciates in storing and transport; but this effect is allowed to be always produced, whatever its amount, which depends on the hardness of the coke. The coke dust thus made has no fuel value.

Facts about Producer Gas.

Mr. F. J. Rowan, writing in "Cassier's Magazine," points out that producer gas is the genuine name for the product of what may be called the comparatively slow resolution of solid fuel by means of heat in apparatus of a variety of designs. While in the ordinary system of gas-making practised in gas-works the heat applied to the exterior of the retorts for the distillation of the coal contained in them is obtained from coke or other fuel distinct from the charge of coal which is being distilled (although the coke may be the product of coal previously distilled), in the producer system the heat is obtained in the interior of the producer by the combustion there of the solid portion of the charge of fuel which is being gasified. It has become so much the fashion to affix the name of the inventor or designer of the form of gas producer used to the product of that apparatus—and thus to speak of "Siemens gas," "Dowson gas," "Mond gas," and so on—that ordinary people may be excused for not recognizing the fact that the "gas" is virtually the same in all these instances, as the process followed is to all intents identical in all kinds of apparatus employing internal combustion for the production of combustible gas. There are such differences in detail as the employment of coke or anthracite in some cases, of bituminous coal in others, of the use of a smaller or larger amount of

steam along with the air required for combustion in the producer (resulting in a greater or less percentage of hydrogen in the gas, and in the preservation of the ammonia formed from the nitrogen of the coal), as well as differences in the form, size, and arrangement of different producers. But none of these affects the principle upon which the production of the gas is based, or the main features of the process as a whole. It will thus be seen that an erroneous idea is conveyed by the adoption of distinguishing names, and that, instead of there being so many inventors or "discoverers" of new kinds of gas, there are only inventors of different forms of apparatus, the object of all of which is the preparation of practically the same kind of gas. As to which form of apparatus is the best, there are, of course, different opinions; but practice and experience have demonstrated some well-defined conditions to which a "producer" must conform in order to be a really good one.

A Suggested Rational Metric System.

The question of the adoption of the metric system was prudently left out of the programme of the engineer's deputation in support of standardization, which, headed by Mr. J. Mansergh, recently waited upon the British Government. The question has lately been considered by the Franklin Institute, of Philadelphia, which formally adopted a resolution in favour of the system. Such a resolution is likely to receive the support of a public body, when it would not be accepted by private business firms. In this instance, no sooner did it get abroad that the Franklin Institute had pronounced in favour of the adoption in the United States of the metric system of weights and measures, than numerous protests from engineering and other industrial firms were forwarded to the Society. Messrs. William Sellers and Co. wrote to point out that the disadvantage of the French metric system is that it is an attempt to measure time, space, and matter decimally; whereas the decimal method is only suitable for counting and computing numbers. Assuming that there would be some advantage in having an international standard of weights and measures, Messrs. Sellers question the expediency of abandoning for it all the incompatibles of existing American and English practice. It is suggested, not for the first time, that if the standard metre were 40 inches long—instead of being, as it is, five-eighths of an inch shorter—all the advantages, such as they are, of the metric notation would be secured by users of the Imperial system without the necessity for changing anything. The originator of the suggestion is believed to be the late Sir Joseph Whitworth. In this way, the length of the inch would become exactly 25 millimetres, so that dimensions would be interchangeable without fractions. If such an exchange were possible, use would soon show which was the more convenient system, and its terminology would gradually supersede that of the other. As it is, vulgar fractions come more natural to the human faculty than decimal subdivisions of the unit. Decimal fractions of materials bought and sold by weight or by measurement are not conceivable. In France and Germany, the use of the half-kilo, which is a little more than a pound avoirdupois, had to be legalized for the sake of the public convenience; and this again is subdivided into quarters and not into tenths, for the weighing of common articles. One of the most serious engineering objections to the metric system, however, is the circumstance that dimensions written in it do not appeal to the natural perception of magnitude and proportion, with the result that mistakes are rendered more frequent and are less easy of detection, especially at a distance from the origin of the communication.

The fourth of the new volumes of the "Encyclopædia Britannica" contains an interesting article by Professor Lunge on "Gaseous Fuel." The principal classes of this fuel are classified by the author as follows: Coal gas, coke-oven gas, producer gas, Siemens gas, blast-furnace gases, water gas, semi-water gas (of which a modification is Mond gas), and air gas, produced by forcing air through volatile inflammable liquids. Professor Lunge says natural gas is of importance in some of the States of North America; but he considers artificial gas of much more general importance.

The average price paid for all petroleum put on the market in the United States in 1901 was 95·7 c. per barrel, compared with $1·19 in 1900. But the average price for Pennsylvania oil per barrel was $1·21. In 1901, 14,250 wells were completed, with 3220 estimated to be dry. The cost of these is estimated at $21,375,000 (£4,275,000), or about one-third of the value of the total crude product for that year. During the year, 1,062,750,306 gallons of petroleum and its derivatives were exported, valued at $71,479,124 (£14,295,825), the average price paid for this oil being 6·73 c. per gallon, compared with 7·52 c. received in 1900.

In the Lycée at San Marino, there is a curious model of a gas locomotive which was discovered by Professor Borbiconi in a cupboard. It appears to have been constructed with the idea of showing how carbonic acid could be disengaged from one of its compounds by attacking a carbonate by an acid. The locomotive was presented to the collection by a lawyer named Angeloni, between Oct. 1, 1867, and March 30, 1868, and was catalogued as "Gas locomotive, constructed to demonstrate how this force can replace that of steam." This model was apparently constructed before Lenoir came out with his motor.

COMMUNICATED ARTICLE.

EFFECT OF VARYING THE CONDITIONS OF COMBUSTION ON THE ILLUMINATING POWER OF COAL GAS.

By H. Leicester Greville, F.I.C., F.C.S.,
Chemist to the Commercial Gas Company.

Many changes have occurred in recent years in the methods of testing ordinary coal gas, all of which have undoubtedly tended to a steady advance towards accuracy. The abolition of the closed photometer and of candles as a standard, were both important changes in the right direction; and with the table photometer and the 10-candle standard, we have now as accurate a method of testing gas of the ordinary 16-candle standard as it is possible to conceive. The abandonment of the rigid 5 cubic feet consumption, and the substitution of the plan of burning the gas up to a constant value of 16 candles, was also a useful and a just improvement. The change does not materially affect gases of higher than 16-candle value, but it minimizes the injustice previously inflicted on those of lower illuminating power. To test gas of lower light than 16 candles in a burner specially made for this grade of gas is obviously wrong for a fixed consumption for both gases. The air supply is practically the same in both cases with the same-sized chimney; and the poorer gas is over-burnt, and the light correspondingly deteriorated.

With the advent of 14-candle gas for the public supply, and the possibility of a further drop in the illuminating power in the future, it is a matter of the most serious consideration as to what is to be the method of testing in order to develop the true light of any particular grade of gas. It is only fair that the gas companies should have gas, of whatever illuminating power, tested in such a manner as to do it justice.

What is the true illuminating power of any particular gas? This is a question which not even the most expert scientist can answer. All we know is that a gas tested under certain conditions develops a certain light, which might vary under other conditions. Take, for instance, the value of so-called 16-candle gas as indicated by the Sugg "London" argand, the various batswing and fishtail burners, and finally by the incandescent system.

In the course of some calorimetric investigations, I have estimated the light of different grades of coal gas under varying conditions, with the immediate object of discovering what was the best method of developing the maximum light (apart, of course, from the incandescent system, which is obviously not suitable for ordinary gas testing). The following table embodies the results so far obtained. It is fragmentary, and needs supplementing by further tests which I hope to publish at a comparatively early date. The subject is, however, of such importance, that I thought it would be interesting to readers of the "Journal" to place on record such evidence as I have already obtained.

Illuminating Power of Gas under Varying Conditions of Combustion.

[The figures refer to candle power.]

No.	Conditions of Testing *quo ad* Gas Consumption and General Remarks.	Sugg "London" Argand for 16-Candle Gas.		Special Sugg Burner for 14-Candle Gas.	
		6 in. by 2 in. Chimney.	6 in. by 1⅞ in. Chimney.	7 in by 1⅞ in. Chimney.	6 in. by 1⅞ in. Chimney.
1	At 5 cubic feet per hour	6·8	..	8·8	..
	Burned up to 16 candles, and calculated back to 5 cubic feet.	10·2	..	..	..
	Chimney full of flame, and calculated back to 5 cubic feet	..	10·9	12 5	..
2	At 5 cubic feet	14·4	15·2	..	..
	Gas burned to 3-inch flame, and calculated back	15·6	15·9	..	..
	With chimney full of flame, and calculated back	15·5	15 9	..	..
5	At 5 cubic feet	..	..	14·1	14·6
	Up to 16 candles, and calculated back	..	..	14·8	..
6	At 5 cubic feet	..	..	13·4	15·0
7	At 5 cubic feet	..	..	8·2	11·0
8	At 5 cubic feet	..	..	13·0	13·1
	Up to 16 candles, and calculated back	..	..	14·0	..
9	At 5 cubic feet	..	..	10·6	..
	Chimney full of flame, and calculated back	..	..	13·4	..
10	At 5 cubic feet	..	..	10·2	..
	Up to 16 candles, and calculated back; chimney full of flame	..	..	12·9	..
11	At 5 cubic feet	12·0	12·4	14·0	..
	Up to 16 candles, and calculated back.	13·3	13·1	14·3	..
12	At 5 cubic feet	11·0	12·0	12·6	..
	Up to 16 candles, and calculated back	12·4	12·7	14 0	..
13	At 5 cubic feet	..	..	11·0	12·8
	Chimney full of flame, and calculated back	..	..	13·0	13·5

I should wish to have made the table more complete, but my time has been limited, and many of the blanks are left for obvious reasons. In some cases, further tests would have been added, but some circumstances prevented it.

Such as they are, however, the figures will afford a basis for some useful comments and inferences. In No. 1 we have as the main point that gas of 8·8 candles on the 14-candle standard burner is raised to 12·5 candles—viz., no less than 3·7 candles—by filling the chimney with flame. In samples Nos. 5, 8, 9, and 10 we also get a rise in light by bringing the gas up to a 16-candle flame. No. 2 shows the effect of both increasing gas consumption and decreasing air supply *quo ad* diameter of chimney, on gas consumed by the Sugg "London" Argand. Nos. 5, 6, 7, and 13 show on the 14-candle standard the increase of light on burning more gas, and further the effect of substituting a 6 inch by 1¾ inch for a 7 inch by 1¾ inch chimney. In No. 7, on an extra low grade of gas, this is very marked. It seems certainly in evidence that the present burners constructed for 16 and 14 candle gases fail to do justice to the gas when a material fall occurs in the illuminating power.

Of course, in the case of the public gas supply, it is highly improbable that abnormally low-grade gas would ever be supplied; but in experimental work on low-quality gases—such, for instance, as making a report on a very inferior coal—the Sugg "London" argand at 5 feet consumption is still frequently used as the standard. The 14-candle standard on 14-candle gas gives materially better results, both by increasing the gas consumption beyond 5 cubic feet per hour and by using a shorter chimney (No. 5); while on gas of a lower quality the effect is most marked (Nos. 7 and 13). The 14-candle standard burner should, in my opinion, be used with a 6-inch by 1¾ inch chimney, and the gas, where possible, burned up to a 16-candle flame.

Should 12-candle or 10-candle gas ever come into the domain of practical politics, it is obvious that a special burner will have to be invented for testing purposes.

TECHNICAL RECORD.

IRISH ASSOCIATION OF GAS MANAGERS.

Annual Meeting in Cork.

The Annual Meeting of the Association was held in the Council Chamber, Municipal Buildings, Cork, last Tuesday, under the presidency of Mr. S. B. Langlands, of Coleraine. On account of the attractions of the International Exhibition in the city, there was a large attendance of members, which fully justified the change in the place of meeting from Coleraine, which was agreed upon last year.

Welcome by the Mayor.

Alderman E. Fitzgerald, the Lord Mayor of Cork, took the chair at the opening of the proceedings, and bade the members a hearty welcome to the city. He said the citizens and himself were pleased and honoured by the presence of a body of so representative a character as was visiting them that day; it was one of the marked compliments which had been paid to them during this year. He hoped the business would be profitable to the members; and he was certain that the result of their deliberations would be instructive to the community at large. He was not going to enter into any particulars relating to their business, but he certainly said this was an age of go-ahead and development in all matters of science; and it was to the credit of the managers of gas companies that they had kept abreast of—and, if they would allow him to say it, ahead of—other developments in science. He wished them all success. He desired that gas managers should produce as splendid an illuminant for the people as possible, and also that those who had invested their capital in the gas undertakings should obtain satisfactory profits. He would have much pleasure in meeting the members of the Association at their excellent little Exhibition in the evening, and in showing them over the place.

The President, on behalf of the Association, sincerely thanked the Lord Mayor for his very hearty welcome to his fine old city. It had been a treat for the members to come to Cork, which, in gas matters, was perhaps unique. They got from Cork one of the leading lights of their profession. He remembered, when he was younger, having met Mr. Denny Lane—a man whose name would go down to posterity in connection with the Gas Institute. On behalf of the Association, he thanked the Lord Mayor for his welcome, and for his kind invitation to the Exhibition.

The Lord Mayor then declared the meeting open, and said he would leave the members to their deliberations. He again wished them every success.

He then vacated the chair, which was taken by Mr. Langlands.

Report of the Committee.

The Hon. Secretary (Mr. J. Whimster, of Armagh) read the annual report of the Committee. It opened with some explanatory remarks in regard to the change of meeting-place, which was decided upon in deference to a general wish that Cork should be substituted for Coleraine, on account of the Exhibition in the city. The Committee then recorded their gratification at the ready response their application for papers had met with, and expressed the hope that this would continue. Feeling reference was next made to the lamented death, under painful circumstances, of Professor Ivison Macadam, who, since his election as an honorary member in 1893, had so closely identified himself with the work of the Association; and the Committee recommended that a resolution expressive of the members' sympathy with the widow and family in their bereavement should be forwarded. The Association had also lost an extraordinary member in the person of Mr. J. C. Adamson, of Airdrie. The roll of the Association was to be extended by a number of new names; while the financial position was shown by the balance of £49 in hand.

Mr. F. Eustace (Tullamore) said he had great pleasure in moving that the report be approved of.

Mr. H. Kirkham (New Ross) seconded the motion, and it was carried.

The Auditor (Mr. G. W. Norman, of Dublin) read his annual report, which was also adopted.

The President then submitted the proposed resolution with reference to the death of Professor Ivison Macadam, which was as follows: "The members of the Irish Association of Gas Managers desire to express their deep regret at the tragic death of the late Professor W. Ivison Macadam, who for the past nine years was an honorary member of the Association, and whose lectures had come to be regarded as a special feature of the annual meetings; and to assure his widow and family of their sincerest sympathy in their sore bereavement." He said Professor Macadam was a tower of strength to the Association, and he thought this was the least they could do to testify their appreciation of his merits.

The resolution was agreed to by the members rising.

New Members.

The following gentlemen were proposed for the membership of the Association:—

Ordinary Members.—Davies, E., Cootehill; Dunn, W., Queenstown; Fitzpatrick, P., Athy; Kirkham, A., Tramore; M'Grath, J., Cork; Taylor, J., Limavady; Tyndall, F. J., Carrick-on-Suir; Young, R., Youghal.

Extraordinary Member.—Davies, J. F., Manchester.

Mr. J. G. Tooms (Waterford) said he had great pleasure in moving that the gentlemen whose names had been submitted on the list read by the Secretary be admitted to the Association. He was especially glad to see their good friend Mr. M'Grath, of Cork, there, and to know that he had joined their ranks.

Mr. J. Cronin (Middleton, Co. Cork) seconded the motion, and it was agreed to.

Election of Office-Bearers.

The President expressed his pleasure in nominating Mr. J. G. Tooms, of Waterford, for the presidentship next year.

Mr. C. B. Tully (Sligo) seconded the motion, and it was carried unanimously.

Mr. Tooms said he thought it would not be right to let the matter pass without thanking the members for the honour they had conferred upon him in electing him to be President of the Association for the ensuing year. He recognized that it was the highest honour which his brethren—those in Ireland, at all events—had the power of conferring upon one of the members of the Association. He could assure them that in his year of office he should do his best to further the true interests of the Association. He had to announce to them that, in anticipation of his election—because when one became Vice-President, the natural sequence was that he got a step higher—he had been looking forward to the Association visiting him; and he was authorized to give them a hearty invitation to make Waterford their meeting-place next year. The Directors of the Company which he had the privilege to serve gave him authority to say that, in the event of the Association meeting in Waterford, they would be very pleased to entertain them. Personally, he should esteem it very highly if they should select Waterford; and if they did, he was sure it would be with both pleasure and profit to the individual members of the Association. He went on to say that the members were aware that the Committee usually considered the matter of who were to be nominated for office; and at the Committee meeting that morning, it was unanimously resolved that Mr. Whimster, their esteemed Honorary Secretary, should be brought forward as Vice-President. He thought it only right to say the Committee had a feeling that some of the members had an idea that the Committee wished to work the whole business. Nevertheless, he, as a member of the Committee, had great pleasure in proposing that Mr. Whimster should be Vice-President for the ensuing year. They were all aware that he was the founder of the Association, and that it was largely owing to his exertions that it was in so prosperous a position; and he considered they should be only honouring it if they made Armagh their place of meeting two years hence.

Mr. J. Patterson (Tipperary) seconded the motion.

Mr. G. Cummings (Ballymoney) thought that the Committee were the proper people to make such nominations as this one,

because they were so widely scattered that it was impossible for the members generally to take the interest in the affairs of the Association which the Committee could do. Therefore, before going any further, he would ask if the Committee considered as to whether they were going to make Mr. Whimster both Vice-President and Secretary.

The PRESIDENT replied that the intention was to make him both.

Mr. CUMMINGS said this was his feeling, because they would be entirely at sea unless they had Mr. Whimster as Secretary.

The nomination was agreed to.

The Committee recommended that the following should be elected members of Committee: Mr. J. Cummings, Ballymoney; Mr. C. W. Stott, Parsonstown; Mr. H. Kirkham, New Ross; and Mr. J. Richmond, Kilkenny.

Mr. A. MACKENZIE (Edinburgh) proposed that the gentlemen nominated by the Committee be elected. They were widely scattered, but they were well known to all the members.

Mr. TULLY seconded the proposition, and the nominations were agreed to.

The HON. SECRETARY and TREASURER (Mr. Whimster) and the AUDITOR (Mr. Norman) were held to be permanent officials, and not to require re-election.

THE PRESIDENT'S ADDRESS.

The PRESIDENT then delivered his Inaugural Address, as follows:

PRESIDENT'S ADDRESS.

I thank you sincerely for the honour you conferred on me, in electing me as your President. Since I joined the Association, I have looked forward eagerly to our useful and enjoyable yearly gatherings; and I can honestly say that I have derived benefit and learned much thereat.

To-day we meet in Cork;-and I take it that our so doing is a recognition by us of the laudable efforts of its citizens to further Ireland's commercial prosperity. Exhibitions have a real commercial value as educational centres. Hearing and reading of improved machinery and apparatus, or of the latest inventions, is nothing to seeing and examining their structure. Let our wish be that this exhibition will be thoroughly successful.

My intention is to give my thoughts on a few of the matters that have been before us in our profession during the past twelve months. If there is any lack of sequence in my remarks, just say to yourselves: "We are out for a ramble;" and if I can make the time pass pleasantly by the way, so much the better.

A deal of attention has been given to the Technical Education and training of future gas engineers; and if some pooh-pooh the subject, others, knowing better, feel that some special training and teaching is necessary to equip our successors for carrying on the ever-increasing duties that form our "daily round." Many erroneous conceptions of the meaning of technical teaching are prevalent. Some fancy it consists in cramming heads with scientific jargon, formulæ, or symbols; others again think that planing planks and sawing wood is the Alpha and Omega of it. Would that they could see and understand the work done in some of our Technical Schools! May it go on and prosper. Then they might understand aright Lord Bacon's saying, "Neither the naked hand nor the understanding left to itself can do much; the work is accomplished by instruments and helps of which the need is not less for the understanding than the hands."

Your answer to all this is, "Put your scheme into a workable shape." So I will attempt this. Take the case of a young man entering the works under us (say) as an apprentice. If he has any "gumption" at all, he will want to know the whys and wherefores of everything. Then comes the question of how to get the answers; and our bounden duty is to put him on to the ladder, and thereafter let him climb until his head tells him that he has gone far enough. Let us first of all find out how far his school days have carried him; then map out a series of evening classes, or subjects for evening study if there is no school—so much to be gone through each year—impressing on him the while the need of applying the knowledge gained. If he is studying building construction, let him absorb the principles and test their application on the buildings in the works; if it is chemistry, let him test its laws bit by bit amid the reactions always going on in gas-works; and so on.

For the first year's study, mathematics, drawing, and elementary physics might be taken up. Second year: mechanics, machine construction, building construction, light, and heat. Third year: chemistry and the advanced stages of the first and second years' subjects. This course of science work makes a good basis, and an introduction to the many good technical books on gas making, gas-works construction, and kindred subjects which have been written. Of these books, I think Accum's "Treatise on Gas-light" led the way; and from the time of its publication until the issue of Hunt's "Gas-Lighting" two years ago, there have been many valuable contributions to our literature. Other sources of information (and very reliable ones) are our clever weekly gas papers. Again, many of our leading firms issue catalogues, and advertisements of their goods; and all I would say is do not despise even such as these bye-ways to knowledge. I classify many of my catalogues, and file lots of advertisements for reference.

Thus far I have dwelt on the more or less scholastic side of the training. Let us glance for a minute at his work-a-day pupilage. Where possible, a few years should be passed in a gas plant works; but where not possible, the progress should be through the fitting and distribution work, then on the works. After that the office and the drawing office; from that to an assistant's place; and finally complete control.

Leaving the subject of the education of the gas engineer, let us consider for a little his possibilities and professional status. My regret is that this phase of our business cannot be spoken of in glowing terms. Corporations and companies advertize too often for efficient and fully qualified engineers and managers at salaries of a very slender nature. You find very important towns offering £150 per annum, and (the pity is) getting applicants. Surely there is need for a Gas Engineer's Protection Society, or at least for an agreement now and then to boycott some of these miserable—aye, miserly—bodies. Town councils are the worst offenders; and the reason is not far to seek. If a gas company get hold of a money-making progressive manager for their works, it is not likely "they'll kill the goose that lays the golden eggs." In the case of councils and public bodies, everybody's interest is nobody's interest; and small salaries seem to be a saving when one has to talk of retrenchment and reform to "the intelligent (?) electors whom one has the honour to represent."

One other remark ere I pass on. It must be felt that our branch of civil engineering is not given its due meed of recognition. Some of the ablest men of the time have been, and are, our gas engineers; and the belated and tardy recognition given this year to one whom we all delight to honour for his true nobility and magnificent work, only accentuates my point.

Let me touch for a moment on one or two matters of direct importance in successful gas-works management. The most important is perhaps our coal purchase. We for the time being are able to purchase coal at rational and reasonable rates—not at the madly inflated prices that obtained in 1900-1901. Now the question is do we in Ireland buy to the best advantage even now? Gold can be bought too dearly, we are told. Well, so can coal. A fashion is sometimes set in coal buying (as in frocks) which is injurious, and does not let us benefit by competition among the sellers. Some of the smaller places gather that a certain coal is being carbonized in a paying gas-works; and immediately there is a demand for that coal and that only. What I contend for is that small concerns have a splendid chance of testing one or two tons of likely coal, and finding out for themselves what is really going to pay them to use. I myself every summer make a series of practical tests of one or two tons of a few different kinds and buy from the results obtained. Thus I have more than one string to my bow and buy at the true value.

Coke with us in the North of Ireland is so valuable a commodity, and sells so well for industrial uses, as well as domestic, that if it were not for the freight on coal, I for my part would be tempted to follow the lead of a friend of mine on the other side, and erect coke-ovens, recovering the gas as a bye-product. The financial results from the coke-ovens erected by my friend must be gratifying to his directors.

Mr. Tully is going to speak to us on slot-meters and Mr. Syme on cookers. Would I be trespassing on their preserves if I urged on managers the desirability of getting our gas used more and more for trade purposes—such as japanning, brazing, steel tempering, baking, greenhouse heating, and the hundred and one other purposes to which it can be put? The cheapening of incandescent lamps, mantles, &c., is a splendid thing for the gas industry; and with this, and a modicum of exertion on our part, we need fear no competitors, be they of the "sparky" electric nature, or the "flashy" oil type. We can as yet give better value, light for light, than any of our opponents.

A complaint was made some days ago in one of our technical papers that sulphate could not be bought at certain works in Ireland, in which it is made. If this statement is entirely correct, then certainly here's another "injustice to Ireland." My own system is not only to sell direct to the farmers around me, but also—by means of leaflets, talk, &c.—to educate them as to the proper use of it; and my reward is that they come back year after year to buy, after having once used sulphate of ammonia.

I would have liked to have gone over more ground in my address; but I feel I have taken up my share of your time. I trust my sins of omission and commission will be overlooked.

THE LECTURE.

Professor C. R. C. TICHBORNE, LL.D., of Dublin, delivered a lecture on "Some Points about the Properties and Testing of Carburetted Water Gas." Our report is under revision by the author, and will be published next week.

READING OF PAPERS.

Four papers were upon the *agenda* for reading and discussion; the titles and authors being as follows:—

"The Prepayment Meter System in Sligo," and "Methane-Hydrogen Water Gas," by Mr. C. B. Tully, of Sligo.

"Gas Affairs in the West of Ireland," by Mr. T. J. Reid, of Ballina.

"Advantages of Gas-Cookers," by Mr. D. W. Syme, of Naas.

All but the last of these, with a report of the discussions thereon, will be found in another part of the "JOURNAL."

NEXT PLACE OF MEETING.

Mr. G. AIRTH (Dundalk) said he had much pleasure in proposing that they accept the kind invitation of Mr. Tooms to meet at Waterford next year.

Mr. TULLY seconded the proposition.

The HON. SECRETARY said that Mr. R. Bruce Anderson, of London, had written to say that if the Association went to Waterford, they would have something there worth their seeing.

The proposal was agreed to.

VOTES OF THANKS.

At the conclusion of the business,

Mr. EUSTACE said he thought it was their duty to pass a vote of thanks to their worthy President for his services in the chair. He was sure they would agree with him in hoping that the meeting at Waterford would be as successful as the present one had been.

The PRESIDENT thanked the members sincerely for their vote. He said his thanks had been in the meeting itself; for to his mind it had been a very successful one. If this were also their opinion, he was satisfied.

Mr. A. MACKENZIE said they had had a very successful day; and therefore he would call upon the meeting to give a very hearty vote of thanks to their esteemed Secretary.

This was agreed to.

In the evening the members were the guests of the Cork Gas Company, who entertained them to an excellent dinner in the Chalet in the International Exhibition. Mr. W. B. Harrington, a Director, presided. Before rising, the Chairman wished success to the Irish Association of Gas Managers, which the President (Mr. Langlands) acknowledged. Mr. Tooms proposed "Success to the City of Cork Gas Company;" and Mr. Kirkham proposed the health of Mr. Langlands. This short toast-list disposed of, the members separated. The remainder of the evening was spent by most in the well-arranged and very instructive International Exhibition, with which all were delighted.

On Wednesday a party of between thirty and forty members and friends went on an excursion to Killarney.

THE METHANE-HYDROGEN WATER-GAS PLANT AT SLIGO.

By C. B. TULLY, of Sligo.

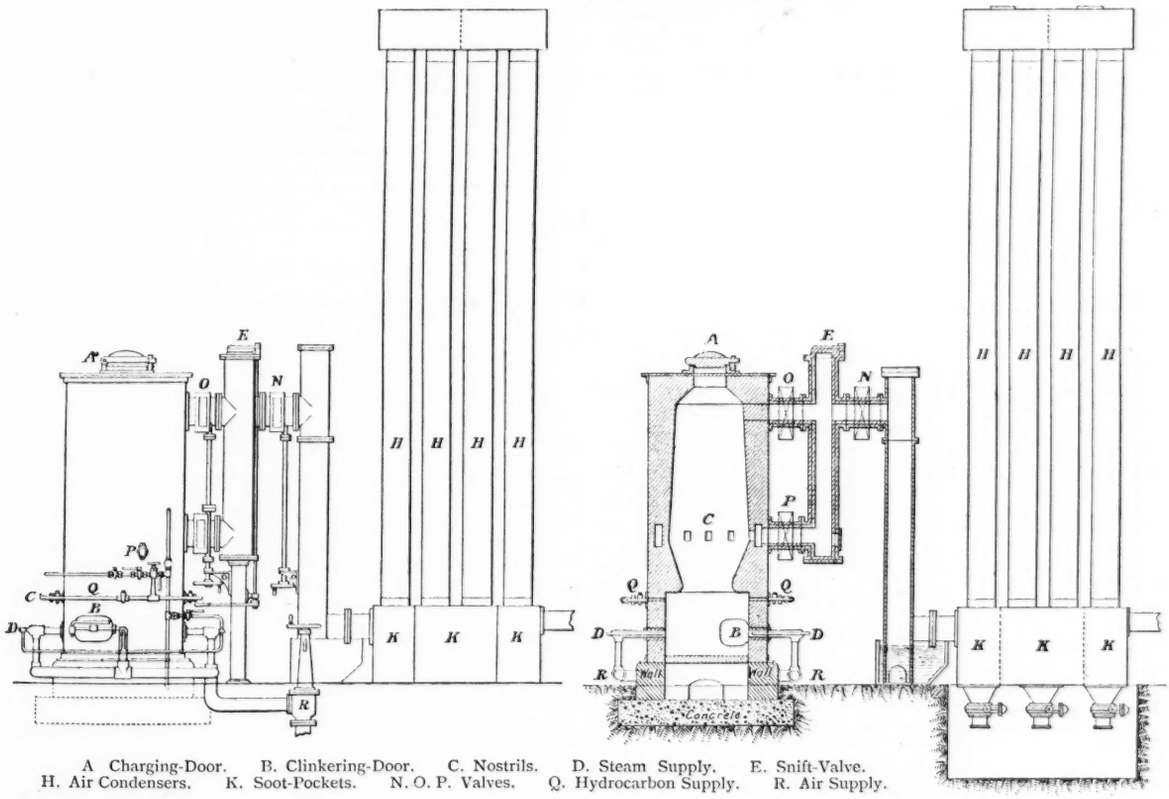
[A Paper read before the Irish Association of Gas Managers.]

After our meeting last year in Dublin, experiments and investigations were continued for some months with the methane-hydrogen water gas plant at Sligo. They had ultimately to be discontinued for other more urgent extensions and alterations to the works, but not until some important and interesting modifications had been made. Trouble was experienced by the formation of a hard pitch in the connections, which led to the choking up of the apparatus. To overcome this, it was decided to modify the plant in such a way as to completely crack-up the tar into gas and free carbon. In the apparatus so modified, it was found possible to do so. The gas, which consists chiefly of hydrogen and methane, is of practically the same constitution as that found in previous experiments before the plant was altered, except that there is a loss of hydrocarbons absorbable by bromine, and an increase of benzene vapours and of hydrogen.

Important features in this modified plant are that it is so arranged that the height of the bed of incandescent fuel is kept constant; the steam is injected through the same openings as the air blast, by which the clinker is broken up, and it is possible to work without fire-bars; and an arrangement of stack-pipe, valves, and connections which allows of the removal of the gases from the generator either at the middle or top, and also allows of the lampblack being brought away with the gas and recovered, or retained in the generator as fuel and burned, at will,

The generator is lined with fire-brick and provided at the bottom with clinkering doors. It is charged with coke or anthracite, or a large proportion of bituminous coal may be used. The fuel, being ignited, is raised to incandescence by means of the air-blasts injected into it at openings close to the bottom. The air-injectors are arranged around the shell at a number of points, and carry in their interior the steam-pipes, so that when the necessary incandescence has been obtained by means of the air-blast, steam may be injected on the area of maximum temperature in the fuel. About midway down the generator lining, a series of nostrils are arranged, leading into a flue bedded into the lining. This flue passes entirely round the generator, and has its exit into a stack-pipe closed at the top by a snift-valve. A second exit is provided close to the top of the generator, and leads into the upper portion of the stack-pipe. Both exits are fitted with valves, so that during the process of blowing the fuel up to the necessary temperature, the products of combustion can be led away through the nostrils in the circumference of the generator lining, and a definite height of fuel kept in a condition of incandescence; while during the succeeding period of steaming the fuel and decomposing the tar, the resulting gaseous mixture can either be withdrawn from the nostrils at the centre of the generator or from the top. Half-way between the nostrils and the floor there is an inward projection, constituting a constriction of the generator; and as the fuel falls through the opening left at the contracted part, it leaves below the projection a space, running round the interior of the generator, in which injectors are fitted at intervals for driving in the tar by steam.

The plant is worked as follows: The generator having been filled with fuel to the top, the fuel is ignited and blown up to a high degree of incandescence by an air-blast through openings



A Charging-Door. B. Clinkering-Door. C. Nostrils. D. Steam Supply. E. Snift-Valve.
H. Air Condensers. K. Soot-Pockets. N. O. P. Valves. Q. Hydrocarbon Supply. R. Air Supply.

MODIFIED METHANE-HYDROGEN WATER-GAS PLANT AT THE SLIGO GAS-WORKS.

left at the lower part of the generator. The products escape through the nostrils half-way up the generator into the stack-pipe and away into the air through the snift-valve. In this way, the fuel is raised to high incandescence for a definite height; and with proper regulation of the air-blast, the escaping products will contain but little unburned matter. The fuel in the upper part of the generator is heated, but not raised to visible incandescence. The necessary temperature having been attained, the snift-valve is closed, and tar or other heavy hydrocarbons are injected by steam into the annular space below the projecting ring; and, being driven into the incandescent fuel, both hydrocarbon and steam are decomposed—the hydrocarbon breaking up into soot and gaseous products, while the steam, in contact with the incandescent and nascent carbon from the decomposition, forms water gas. At the time that this action is proceeding, some steam is injected through the pipes in the interior of the air-blast tubes, and this, playing upon the clinker formed during the blow, breaks it up, while the steam is converted into water gas.

The various gases formed during this portion of the process pass upwards, together with the finely divided carbon from the decomposition, which latter is filtered from the gas by the comparatively cool carbon in the upper portion of the generator; and as the fuel gradually sinks, it is brought down into the zone of combustion below the nostrils, and, on account of its fine state of division, is utilized before the larger masses of fuel in the actions taking place. The mixture of hydrogen, carbon monoxide, and methane, formed in the second period of action, leave the generator near the top, and, passing into the stack-pipe, leave it by a pipe which forms a cross junction with the upper exit from the generator, and which is closed by a valve when the snift-valve is open for blowing, but is opened when the snift-valve is closed.

In places where there is a demand for lampblack, it will be found more economical to recover it than to burn it away in the generator. And this can be done by leading away the gases, laden with finely divided carbon, through the nostrils, and thence through the stack-pipe and the same valve as before, to a series of atmospheric condensers in which strips of asbestos are suspended, on which the carbon deposits, and from which, by a jigging arrangement, it can be shaken into sealed receptacles.

No estimate of any value can be made as to the cost of the gas with plant on so small a scale; but there is every reason to believe that the cost will not much exceed that of "straight" water gas. The illuminating power of the gas varies from 10 to 12 candles; and it has a calorific value of about 380 B.T.U.

This plant should form a valuable adjunct to big carburetted water-gas plants, where the heavy oil is practically waste product, and even when burned under boilers is a nuisance, and not economical as compared with breeze fuel and forced draught. A generator of this kind could be put up as an auxiliary to the ordinary plant, and the oil tar could be entirely gasified, and a large addition made to the output of the works at a very small extra cost. The gas so made, containing a good proportion of methane, would, when added to the carburetted gas in bulk, make no difference in illuminating value, as the increase due to the presence of the methane would counterbalance the diluting effect.

The plant has been thought out in conjunction with Professor Lewes, who visited Sligo last summer and inspected the original plant as designed and erected by the author. The result is this modified and perfected plant. The author is greatly indebted to Professor Lewes for the willingness with which he placed his valuable knowledge of the subject at the author's disposal.

The author regrets that he is unable at present to furnish more data of the working of the plant; and he can only repeat his wish, expressed last year, that other engineers may be induced to take up this interesting subject.

Discussion.

The PRESIDENT (Mr. S. B. Langlands) said the members ought to feel proud of having such a gentleman as Mr. Tully connected with the Association. He had gone into research work pretty freely, and he (the President) only hoped his researches would go on, and result in making the work of the gas manager easier in the future. He thought he could see how it would.

Professor C. R. C. TICHBORNE said he was not going to comment upon the paper further than to say that such contributions must be invaluable to an Association like this, because they would touch upon a new field. He was not a practical gas manufacturer, and therefore he would only ask a question of Mr. Tully. He must confess that he was surprised at the low illuminating power obtained when carburetting with American oils. It was a long way from 10 to 20 candles, and perhaps, for his education alone, Mr. Tully would give them information upon this point: How was it that the contrast arose? He should also be glad to know whether Mr. Tully, in the course of his experiments, had ever worked with anthracite, and, if so, what were the results as compared with coke. They were very much obliged to Mr. Tully for giving them the paper, which was, as it were, a breaking of new ground.

Mr. G. AIRTH (Dundalk) said he had had a good deal to do with oil gas—not carburetted water gas, but oil gas pure and simple, or at least as pure as they could possibly get it; and they were certainly troubled a good deal at first with lamp-black, or carbon deposited in that form. He thought Mr. Tully had been able to do a good deal to get over the trouble; and he was sure they would all be pleased to hear more from him about his research work in this direction.

Mr. J. G. TOOMS (Waterford) said he thought it was generally understood last year that papers should be in the hands of the members a few days before the meeting, if possible. The one before them scarcely lent itself to discussion, the members having only just heard it. No doubt when they came to read it, there would be several points upon which they would wish to put some questions to the author. He (Mr. Tooms) would like to ask, assuming, from the paper Mr. Tully read last year, that this was an auxiliary to coal-gas plant, at what point he mixed the gases. He remembered that Mr. Tully had an enricher, and he imagined that it would be interesting to the members to know what was his *modus operandi* with his enricher—which was something like a laboratory on a large scale—and his coal-gas plant.

Mr. W. DUNN (Queenstown) asked if Mr. Tully would inform them at what price per 1000 cubic feet his gas could be made, because, looking at it from a practical point of view, he thought it would be dearer than coal gas. But if it was only to be used in times of emergency, he really considered the apparatus would be out of place.

Mr. J. W. R. WALL (London) asked if an installation of the character referred to could be put up in place of a coal-gas plant, and, if so, if it would enrich the gas.

Mr. TOOMS asked whether there was any difficulty with the tar. Was it watery; and did Mr. Tully treat it specially?

Mr. TULLY, in closing the discussion, said, in reply to Professor Tichborne's remarks as to illuminating power, that he experimented with American oils, but found they were too expensive; and, as he mentioned in his paper last year, he fell back upon tar. He came to the conclusion that the only thing he could do was to use tar, because it would not pay to use oil. Nothing surprised Professor Lewes and himself more than when they did not get any illuminating power at all. Their idea was to completely crack up the oil into carbon and hydrogen. This was what they expected to do; but they found, on the contrary, that they were able to make illuminating gas of from 10 to 12 candle power. The only way he could explain this was that it was impossible to thoroughly break up the tar into its elements of hydrogen and carbon, and that the tar, on being injected, was protected by the steam, and that it was absolutely impossible to have it altogether broken up. Of course, there were points in regard to the reactions taking place in the process which required further investigation. In some way or other they got the tar decomposed into benzine vapour. That was only what they expected. He had not made any experiments with anthracite. In regard to cost, he thought he mentioned in his paper that with plant on such a small scale it was impossible to arrive at the cost with any exactitude; but, inasmuch as the tar and coke in the generator yielded about the same quantity of gas, he could not see why the cost per ton of fuel should not be about the same as in the case of ordinary carburetted water gas. There was no reason why they should not be, weight for weight, the same. And certainly the gas was cheaper—about 6d. per 1000 cubic feet, as compared with 1s. 5d. or 1s. 6d. per 1000 cubic feet with coal gas. He mixed the gases in the hydraulic main; but, owing to his mains being so small, he had to bye-pass a quantity into a separate gasholder, and it was pumped into the gas as convenient. The tar was run in in its pure state, freed from water only by settlement; and it was decomposed by complete combustion. Mr. Wall asked whether the plant could be used in place of coal-gas plant, and if the gas could be enriched. When Professor Lewes saw the works and tested the gas, his first remark was that the gas could be supplied as it was made, without any enrichment whatever. Of course, it was a gas which would lend itself to enrichment by benzol, the same as coal gas.

GAS AFFAIRS IN THE WEST OF IRELAND.

By T. J. REID, of Ballina.

[A Paper read before the Irish Association of Gas Managers.]

At the meeting of this Association held in Sligo two years ago, a paper was read descriptive of an English engineer's impressions of small gas-works in various parts of the country, but chiefly those in the West of Ireland, which revealed a state of affairs in those concerns anything but creditable to those responsible for them. Obsolete plant and badly planned and primitive working methods seemed to characterize most of the works met with. The picture drawn was not calculated to inspire one with an exalted opinion of gas matters in the West; and I have noticed in those whose business brings them to our works an ill-concealed scorn for what they doubtless consider lamentable lack of enterprise in the management.

I remember interrogating one of those gentlemen on this matter when in England without revealing my own identity; and I give you his impression of the average small gas-works in Ireland: "An ill-kept yard lumbered with *débris* of all sorts, the collection of ages, a portion of which would be of value in a collection illustrating early gas-works practice, comprising, as it does, many quaint and long-forgotten forms of apparatus which your modern gas engineer has probably only seen reproduced in

old text-books. The retort-house, purifiers, and other apparatus bear out the general air of utter stagnation which pervades the place, and a sleepy stoker, reluctantly emerging from some secret lair, affords the necessary life to prevent the intruder thinking the place derelict."

Now, this fancy picture may have had some counterpart more or less true ten years ago, when the long days of summer were one long holiday for the small works; but since then the situation has changed considerably, and a general awakening, concurrent with a similar social advancement in the condition of the people, has roused gas concerns to an appreciative sense of their duty. This improvement in the people is not a little due to the increasing numbers of Irish Americans who visit their friends in the "Ould Country" annually; and there can be no doubt that the advanced notions of the American are being very quickly assimilated by the people here. Unfortunately, the American visitor inculcates the doctrine of electric lighting to his hearers; and the result is that those who recently knew no better illuminant than the modest "dip" now clamour "for the light of the future" (?) as the correct thing, with a faith in its merits and an indulgence to all its shortcomings which admit of no argument to the contrary, and which cannot fail to inspire a feeling of envy in the breast of a gas manager writhing under a sense of injustice regarding his own product.

The author of the paper mentioned admitted, by way of preface, that his views of the question were necessarily superficial; and I can quite conceive that an English engineer familiar with gas-works methods as they obtain in the larger towns in England could find little to commend in a casual and hurried visit to small works in Ireland. It must not be forgotten, however, that the conditions of life in our small towns differ so widely from those in England or Scotland that the up-to-date and progressive policy which finds its reward there may not on that account meet with equal success if similarly applied in the West of Ireland—in fact, it is more than probable that financial disaster would ensue were the policy adopted.

To the want of capital was chiefly ascribed the backward state of our gas industry. While I admit that this has proved a serious obstacle to expansion and development, yet I do not think it has militated against progress to the extent believed, as the same scope and outlet for capital does not exist in our small towns as is the case in other portions of the kingdom. We have a different customer to cater for. The towns are not self-supporting, as most English towns are, but are solely dependent on the surrounding country for existence; so that the average condition of our town dwellers cannot compare with that of the residents in an English town. It is the want of outlet for capital more than the want of it that presses so heavily on our gas undertakings; and I daresay that it is the knowledge of this fact which renders the raising of capital so difficult, even where excellent reasons can be advanced in its favour. Capitalists in Ireland do not regard gas investments with the same favour that they are accorded elsewhere; and therefore a banking concern has to be resorted to, and a high rate of interest prevails. I often wonder that English capitalists seeking an investment which will return bigger dividends than most gilt-edged securities, do not come to Ireland and put their money into gas-works. I know of many cases where this could be arranged, to the mutual benefit of both parties.

Contrast the condition of things in progressive manufacturing towns in the neighbouring countries with those in a West of Ireland town. In the former, there are various industries giving employment to all who will have it, by which many families earn from £2 to £5 per week. These people live well and are comfortably housed. The shopkeepers are correspondingly prosperous; and through the whole place there is evidence of power and wealth. It is not hard to find employment for capital there. The shopkeeper burns gas lavishly; and the artisan and his family are encouraged in their extravagance through the medium of a slot meter. The gas-cooker finds ready acceptance with them, the use of peat being unknown in their domestic economy. Gas-engines, too, are numerous, and many new outlets are found for the industrial application of gas.

How does this parallel with a village plumped down in a wilderness of bog, in a district sparsely populated, but all too thickly, perhaps, to enable each to win a proper sustenance from the unwilling soil? There are no industries whatever, and the town lives on the needs of the country folk. The population is steadily decreasing—furnishing its quota to the numbers who have, unhappily, gone to the United States. The gas-works have been erected perhaps forty or fifty years ago; and no increased demand for gas having occurred after the first few years of its inception, no pressing necessity for larger plant has forced the adoption of improved apparatus from time to time. There is therefore no cause for astonishment when one sees plant forty years old in active service to-day.

It follows, as a natural sequence, that under such circumstances the growth of an undertaking must be slow. It relies for an increase of business not so much upon an increase in the number of consumers as on an increased consumption per consumer; and it is when the point of saturation, so to speak, has been reached, that a differential price for gas can be beneficially introduced. This, I think, is preferable to reducing the price all round, and, as a means to an end, possesses strong recommendations. It is impossible to hope for any considerable increase of gas consumption in our small towns, no matter what price is charged. Gas cookers and fires do not meet with the favour that they deserve; and the artisan, who is the chief supporter of the slot cooker elsewhere, is not represented here. We are told that the price charged for gas is excessive; but in many towns, both in England and Scotland, not situated near the pits, considerably higher prices prevail. It would be interesting to learn how such an apparent anomaly can be accounted for.

In short, then, I contend that gas affairs in the West of Ireland are governed by different economic and social influences to those of places more fortunately situated; and although there are many problems to solve which are quite unknown to managers of works in the sister country, the gas concerns in Ireland are as efficiently controlled as circumstances the reverse of encouraging will permit. Our managers have at all times shown aptitude and zeal in furthering their profession, by adopting, where possible, improved methods of manufacture, and, where feasible, applying the newest system of illumination. In this respect, they are not behind their more favoured brethren on the other side of the Channel.

It may be of some interest, and I trust not unprofitable, if I relate what has been done to modernize the works whose destinies I am privileged to preside over. By modernize, I do not mean that a clean sweep was made of all the old buildings and plant and a brand new works erected, replete with all sorts of patent appliances, which in a works of the size would make my lot more miserable than it is. I do not believe in discarding anything because it is old, even if a small improvement can be obtained from newer plant. I have a shrewd idea that there are many works in England labouring under the load of *ultra*-modernization, to coin a term; and I have a suspicion that there are engineers of works whose life is a misery to them through trying to show improved results from 'plant which they have recommended to their committees, but which have not quite fulfilled expectations. In altering our works, therefore, all old plant was used where possible. All the old buildings were retained, and the arrangement of the plant was made so as to avoid structural alterations as far as possible.

Let me describe the works as I found them. Their condition was such as to delight the heart of those who think no good can emanate from Ireland. They were erected about forty-five years ago by a Scottish firm, whose desire it would appear to have been to do everything in the most peculiar manner. The result attained was the most wretched libel on a gas-works that could well be imagined. Everything was wrong. The site was on the bank of a tidal river, which subjected the works to periodical inundations, necessitating the qualifications of a gondolier in addition to those usually considered necessary in a gas manager. Provision was actually made for this state of things by the inlet and outlet pipes of the holder rising 2 feet above the ground level; and an ugly excresence on the roof of the holder was provided to accommodate them when the holder was down.

The works consisted of one holder, one purifier, condenser, retort-house, and a number of wooden sheds for coal storage. There was neither meter, governor, nor scrubber. The condenser was poised on the top of the boundary wall, some 10 feet above the ground, and was provided with a tar-cistern of large capacity, this being the only tar reservoir. The condenser was an excellent landmark; and there it remained, a monument of incapacity and ignorance, and at the imminent risk of falling down. The holder I consider a marvel. It is simply a shell, no trussing of any sort being provided. The roof, when the holder was at the bottom, assumed a concave form which afforded lodgment for rain, and often I never expected it to rise again. It always did, however, with many groanings and mutterings. To complicate matters, *débris* had collected at one side of the tank bottom so that the holder settled unevenly and soon wrenched away all the guide carriages, and, being thus unrestrained, pursued an erratic course up and down.

A system of rope-guiding had been instituted to maintain the holder on an even keel; and the experience thus gained has so prejudiced me against this system that only strong inducements would cause me to have anything to do with it in future. I am not sure if the patent for this method of holder guidance was infringed. Certainly it was not a brilliant success. Pulleys were fastened on top of each column, ropes reeved through and attached to the holder at one end, and the other depending to the ground and hauled taut and belayed. This necessitated constant attention, especially when the holder was descending. On a stormy night the vicinity of the holder presented the appearance of nothing so much as a ship beating to windward against a gale. First one sheet—rope, I mean—let fly, then another; now a pull on one halliard, now on another; sometimes the holder seemed possessed of a desire to anticipate the flying machine and soar into regions above.

That particular winter was a lively experience. To the pranks of a dissipated gasholder was added a breakdown of the retort-bench, leaving one setting of four retorts to supply the demand. Luckily this setting was a good one (the original of that described by my brother in a paper some years ago), but the heats being necessarily high, almost constant stoppages of ascension and dip pipes gave endless worry. The hydraulic main was laid on the top of the bench, and the heat converted it into a veritable tar still. The foul main ran straight to the condenser, a distance of only 18 feet, and then very imperfect condensation took place, the first few pipes of the condenser being quite warm to the

touch. From the condenser the gas went through a single length of pipe to the solitary purifier; and, unnecessary to relate, the improperly condensed gas, laden with tarry vesicles, caused trouble unending here.

The purifier had to be emptied three times a week, rendering a complete stoppage of gasmaking imperative. How awkward this was in the depth of winter, with a holder at zero and only imperfect plant to fall back on, you can easily imagine. Lime was the purifying agent used, spread in thin layers of about 5 inches, and even then the tar coating found beneath the bottom layer soon increased the back-pressure to an uncomfortable degree. Some means of relieving the distress thus occasioned had to be devised. This was successfully accomplished by a byepass arrangement for the bottom layer, which has not yet been patented, and which I commend to anyone similarly placed. It consisted of a rope tied to a wood grid in the bottom layer, and brought up through each successive layer, being secured on the top near the air plug, When the back-pressure exceeded ordinary working conditions. all that had to be done was to pull up the rope, which, of course, lifted the grid, allowing the gas to pass through unhindered. From the purifier the gas went direct to the holder, the inlet of which frequently choked up with naphthalene deposits; and as the cap of the syphon was 2 feet below the surface of the water, clearing the obstruction was a work of some difficulty.

Even a winter such as that described comes to an end. But working under such conditions was not conducive to good results; and the following summer saw the beginning of the alterations which have now almost reached completion. Attention was first required by the holder, which was a positive source of danger. In the month of June, notice was given that the supply of gas would be discontinued for some time. The holder was emptied, and the local fire brigade manual pump was pressed into the service for emptying the tank of water. This was accomplished in four days. At the bottom was found a horrible conglomeration of filth, mud, tar, and water, with a heterogeneous collection of articles, forming a mixture most unpleasant to dislodge. However, it was got rid of eventually; a score of men and boys being converted into mudlarks in the attempt. The old cast-iron columns were removed and H-section joints used instead, going right down to the bottom of the tank and embedded in concrete there. They were also secured at the ground level by stays embedded in concrete, and again at the top by T-joists from one to the other. Counterbalance weights were also provided. The holder itself was repaired where necessary; the bottom curb being bent and bulged by the uneven settlement. The sheeting of the holder was in a remarkable state of preservation, showing as bright inside and, when the coating of tar was removed, outside as if it had just come from the mills.

The holder repaired and working, the purifying arrangements were looked into; and it was found that, owing to the arrangement of the works, little space was left for extension in this respect. The purifiers could, of course, have been placed in another portion of the yard; but this would have involved too great expense, and it was decided to erect two new purifiers in line with the old one. This allowed a 4 feet gangway between the purifiers and the retort-house; while on the other side the boxes were close up to the boundary wall. This left little room for working; but, by some manipulation, fresh material can be introduced with ordinary facility, the spent lime being shovelled through ports made in the boundary wall into a lane, whence it can be loaded into carts.

The retort-bench now merited attention, and two beds of three and five retorts, respectively, were erected on the shallow regenerative system, very similar to that described by Mr. M'Lusky, of Perth, at the North British Association meeting last month. This required a sunk chamber 3 feet deep, extending about 8 feet from the front of the bench. Although the depth of setting does not allow of any elaborate arrangement of air and waste-gas flues, yet, by making the air flues of ample size, and sandwiching them between the waste-gas flues, one above and one below, splendid results have been attained. It seems to me that going to extreme depths to effect complete regeneration is not justified altogether in practice, especially in small works; and it would appear that the air reaches its maximum temperature more readily than is credited generally. The only valid reason that can be advanced is, I think, the improved working from increased depth of fuel, which need not be of such good quality as the shallow producer requires. Some difficulty was at first experienced in adjusting the air ports and dampers, as I had been misled by the positions found suitable for them in similar settings elsewhere. Once the correct position was found, no difficulty was felt in keeping high and regular heats from back to front. This latter point I consider of very great importance. From 8000 to 10,000 cubic feet per mouthpiece have been made in the twenty-four hours with this setting.

New retort-bench ironwork was put in at the same time; and also a new hydraulic main in two sections, with seal-adjusting and tar overflow valve to each, leading to an 8-inch foul main at the back, which was increased to what may be considered the extraordinary size of 18 inches. This latter portion was of steel, and was continued round three sides of the retort-house, with a slight fall from the hydraulic main. This may seem contrary to the accepted practice; but the results have justified the adoption of the idea. The gas is slowly cooled in the large main, and in this state is able to pick up some of the light-giving constituents from the tar, which is withdrawn from contact with the gas before condensation has proceeded too far. I cannot but think that this has had a beneficial effect on the illuminating power of the gas, although I have not been able to test this accurately. At any rate, all naphthalene troubles have disappeared. The foul main has also served to assist the condenser in the due performance of the duties required of it.

The foul main, on its exit from the retort-house, is reduced to 8 inches, and connected to a seal-pot in the ground, whence all condensed tar and liquor are conveyed to the wells. The gas-main is carried underground to the condenser, which, removed from its high estate, now reposes in a more lowly, if more sensible, position. The removal of the condenser intact involved considerable trouble. The mechanic sent me by one of the largest firms in the gas plant business proved unequal to the task, and when a steam derrick was not immediately procurable, turned his back on us and left. However, it had to come down, and as it was now October, no time could be lost. The condenser was bye-passed by a curious arrangement of stove pipes, and the old purifier converted into a cooling vessel for the nonce.

The work of removal was accomplished successfully by the aid of screw-jacks, without accident or incident. While this was being done, an exhauster, driven by a gas-engine from a countershaft, was being erected. This was put in a building 32 ft. by 24 ft., the countershaft running the whole length of the building; the intention being to use this as a workshop, where a lathe, drilling machine, or grindstone can be power-driven. The exhauster I have found invaluable, and I wonder that exhausters are absent from so many small works. I am afraid the dread of having running machinery to look after has militated against their adoption. This need not deter any hesitating manager from carrying out his desires in this respect, as a gas-engine requires so little attention that one often forgets it is in the place. Besides, the constant advertisement it affords may have the effect of tempting a customer to have one for his own use. From the exhauster, the gas goes to the scrubber, which, after due consideration, I decided should be of the rotary type, and driven by chain-gearing through the wall of the exhauster house.

I consider this piece of plant the most valuable in the works. It is called the "New" scrubber-washer, and amply fulfils all that the makers claim on its behalf. I need not describe its construction, except to say that it is a horizontal cylindrical vessel divided vertically into five chambers, sandwiched between each two being a "still" chamber. Through this vessel runs a horizontal steel shaft, keyed to which are five circular brushes of special construction, revolving in the five chambers. The vessel is partly filled with water, which is admitted into the outer chamber, and passes from one to the other, absorbing ammonia as it goes along, until at the outlet it is of great strength, and is then capable of extracting a considerable portion of carbonic acid and sulphuretted hydrogen from the impure gas, which is compelled to pass through the revolving brushes, and is brought into intimate contact with the water in the process. In practice, the liquor from the wells is pumped to a cistern, and conveyed thence to the third chamber, so as to work up all the liquor to the desired strength. A minimum quantity of fresh water is supplied to the fifth chamber—sufficient to ensure gas free from ammonia at the outlet of the apparatus. In addition to its legitimate objects, the washer is a splendid tar extractor. I have no doubt that the days of the tower scrubber are numbered, as both in cost and efficiency the washer described is much its superior; and the question of power to drive it is not the important factor it is represented to be.

A station meter and water-loading governor are among the latest additions to the works; so that now the actual manufacturing plant is complete and up-to-date, and the difference in working under the old *régime* from that which now prevails makes me wonder if the past was not a hideous nightmare instead of a painful reality. Not the least effect that has accrued from the new order of things is the improvement in the lot of the stoker. Purifiers are changed once each month, instead of three times a week, as no impediment is now offered to the flow of gas, though the purifiers are filled practically solid with material to the depth of 4 feet. I have lately started the use of bog ore, and have met with fair success; and I would gladly accept any hints anyone present can give. With the improved retort-settings, fewer retorts in action are necessary; and this lessens the continual clinkering that was required before. The exhauster is accountable for an increased make per ton of coal, and it keeps the retorts free from carbon, which formerly gave endless bother. The change effected has been altogether marvellous; the capacity of the works having been increased threefold, with the exception of the holder, which, I trust, will soon be replaced by one double the size.

While the works themselves have been undergoing alterations, distribution, improved lighting, and the sale of cookers and fires have not been neglected. The street lighting is done principally by incandescent burners "C" and Kern patterns, and lit by the old-fashioned ladder method. This, I think, is the better way where the lamps are extinguished before midnight, as the loss, if pilot lights are kept burning eighteen hours per day, must be considerable, and outweigh any æsthetic advantage which that system may possess. The upkeep of incandescent burners at a fixed sum per annum has also been attempted; and some such arrangement has become absolutely necessary, more particularly, I think, in all small towns, where the gas company are looked to to put all trifling matters right. With incandescent burners the

situation becomes impossible; and the ordinary consumer, not being able or willing to take the necessary trouble to maintain his burners in a state of efficiency, it is incumbent on the gas company to take the matter into their own hands, and to see that the burners receive the attention they deserve, by which means only can the merits of incandescent lighting be enjoyed. It is unwise to shirk this responsibility. The incandescent burner is, at best, a frail construction, needing special care and treatment to prove a success; and this supervision must be exercised by the gas company until the average person becomes less clumsy, or the mantle is improved so as to resist shock. Gas-fittings are supplied at cost price, and only a nominal charge made for fixing.

The desirability of creating a day-load has been appreciated, and the usual steps taken to secure this end. Gas-cookers have been introduced, but have not been received with the avidity which appears to be the case elsewhere; and where installed they have not been used to the extent that I would like. Every facility is given in the way of their adoption. No charge is made for fitting, and the rents are very low. No opportunity is lost in bringing home to probable customers the economy and usefulness of a gas-cooker, both by advertisements in the local Press and by personal canvassing; and although the result has not been as encouraging as might be, I have no doubt that in time their adoption will be more general.

High-pressure and self-intensifying lamps have been experimented with; and a unique opportunity of testing these against electric arc lamps presented itself. An adjoining millowner erected an electric light installation driven by a turbine, and a 1000-candle lamp was recently suspended outside his premises. In the same street was an ordinary 15-candle power gas-lamp, which, of course, did not show to advantage, and the individual merits of the rival lights were valued in the minds of the uninitiated in proportion to the disparity shown between these two particular lights. I therefore erected a high-pressure lamp of 1000-candle-power over the gas-works gate. The result was surprising to those whose inbred belief is in the superiority of the electric arc. The high-pressure light was a very beautiful one indeed, steady, rich, powerful, and much pleasanter and more effective than the electric arc, both as regards the colour of the light and its diffusive qualities. A 700-candle self-intensifying lamp of German make was also erected; and the light from this was superb, and left nothing to be desired. When the construction of the lamp and burner is further improved, it will be found a very valuable factor in our hands in satisfying the craving for high-power lighting, which hitherto has been considered to be the special domain of the electric arc.

An attempt has been made to insidiously introduce the electric light into the town; permission being sought from the Urban Council—but refused—to supply certain business places with current from the plant mentioned. It would seem that electric light producers pursue similar tactics whatever locality they may seek to invade; and in my case, as in others, the usual wild statements as to the cheapness of electric light, compared with gas, were advanced—light at half the cost of gas being promised. Statements such as these, while quite impossible of fulfilment, as you all know, are received with wonderful credulity by the layman, who cannot see why light produced by such a simple method as attaching a dynamo to a turbine should not be supplied for next to nothing; and, naturally, a feeling of discontent is provoked, which gradually increases to a complete distrust of gas and all its works. And where the person so afflicted cannot get cured by a practical trial of the question, as in my case, the situation is anything but desirable for a gas manager.

The feeling of unrest among consumers is regarded with peculiar distaste by gas managers, as experience has shown how unreasoning and illogical the average community becomes whenever ideas similar to those mentioned above gain general acceptance. In such cases it is almost hopeless to argue; and the only thing the manager can do is to use his best endeavours to cope with the epidemic, by disseminating any literature on the point at issue he can lay his hands on, and, if necessary, supplement this by a circular compiled by himself dealing with such special features as the case may present.

You will admit that the past few years have been full of incident for me; and I know the advancement in gas matters in my locality is typical of similar works in the West of Ireland, following the example so well set by Mr. Tully, of Sligo, whose achievements we all recognize. I think, therefore, that gas affairs in the West of Ireland are in anything but a stagnant condition. On the contrary, they are alive with a tense energy and ambition, and are controlled by men capable, shrewd, and progressive, able to make the most of what they have, and not inferior in knowledge or attainments to their more fortunately situated *confrères* across the water.

Discussion.

The President (Mr. S. B. Langlands) thought the paper was a very effective counterblast to the one read by Mr. Percy Griffith two years ago. He would like to hear what the members had to say about it—as to their own individual work or as to the paper itself.

Mr. C. B. Tully (Sligo) said Mr. Reid appeared to condemn Mr. Griffith in the opening of his paper; but, if they followed him, he seemed to back that gentleman's version as to old works. Mr. Griffith read his paper at his (Mr. Tully's) request, and at the time it was considered a very valuable one; so much so that it was suggested by some of the members that it should be circulated and supplied to all gas managers and directors. He had no doubt that Mr. Reid's advanced ideas were due to such papers as that read by Mr. Griffith.

Mr. G. Lennon (Dungarvan) said he was present when Mr. Griffith's paper was read, and he sat very uncomfortably all the time, until he found out that the paper did not refer to his own works. If the author had come and examined them, the paper would have been an exact description of what they were at the time. When he took charge of his present works, if any gentleman called to see the Manager, he was generally told he was not in, because he was ashamed of the state in which they were. However, within the last ten years they had all, like Mr. Reid, improved, and none of them had gone back. They were all advancing; and he thought the reason that gas-works were in such a bad condition ten years ago was that they had the electric light scare on, and were all frightened that they would soon be wiped out. Since then they had had a taste of what the electric light could do, and had come back to the belief that there was still a chance for them in their old country.

Mr. H. Kirkham (New Ross) said he had a couple of questions to ask Mr. Reid. He spoke about his works being flooded, and about the inlet and outlet pipes requiring the crown of the holder to be raised to suit them. What struck him (Mr. Kirkham) was that, seeing there was such a state of things as this, Mr. Reid should have put down more plant. Another thing he would like to know was the size of the retorts; also the size of the gas-engine which Mr. Reid worked for the scrubber, &c., because at some future time he hoped to put in a scrubber; and he was debating whether a tower or a rotary scrubber would be the better appliance. He was inclined to think the latter. But he wished to know the size of gas-engine used. The one he himself had was a domestic one, and the governor would not work.

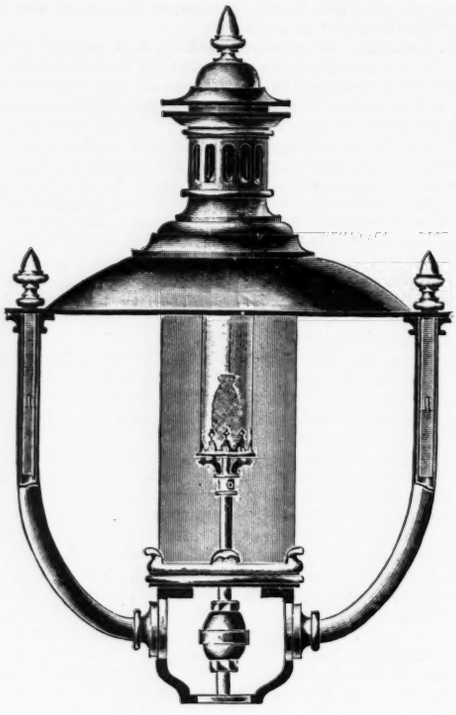
Mr. J. Richmond (Kilkenny) said he enjoyed Mr. Reid's wholesale denunciation of the original construction of the works. He remarked that the holder was in a deplorable state, on account of the want of trussing in the crown. In his (Mr. Richmond's) experience, trussing was of no use, but was often a source of annoyance. Among the disadvantages alluded to, the want of trussing was not one of them.

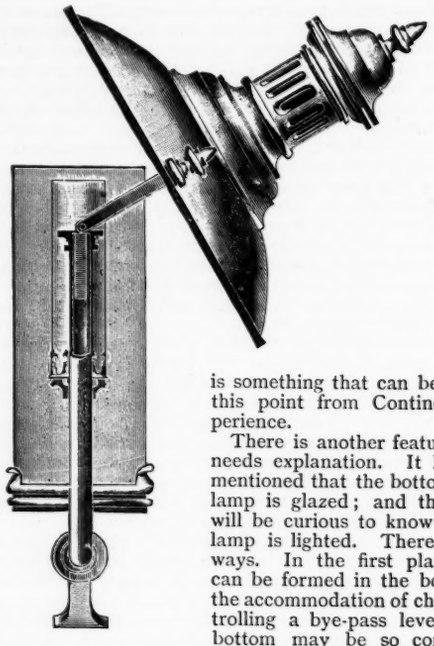
Mr. J. G. Tooms (Waterford) said the paper was entitled "Gas Affairs in the West of Ireland;" but he thought that "The Reconstruction of the Gas-Works in Ballina" was what it was about. He would like Mr. Reid's definition of "the West of Ireland." As regarded the first part of the paper, about obsolete plant, the sleepy stokers, and so on, he gathered that this referred to the paper read at Sligo. He did not hear that paper; but he did not consider that its author was far wrong, according to his experience of the South of Ireland. But managers of small works now seemed to be all up and doing. Reference had been made to plant forty years old. If that was all the fault to be found with it, he thought it was a poor reason for abolishing it. He knew some plant of this age which was as good for its work now as when it was put in. Mr. Reid had spoken of not attaining the success in placing cookers that he could wish. From the knowledge he (Mr. Tooms) had obtained during the past three or four years, he thought no one could define the reason. He knew several small and averaged-sized towns where they had great difficulty in getting an increased consumption of gas for a year or two, and then, all of a sudden, there had been quite a rush for cookers. In other towns again, where they had been introduced, they seemed to have caught on at once. He would advise Mr. Reid to place some cookers on approval, and remove them, after a month's trial, if they did not give satisfaction.

The Hon. Secretary (Mr. James Whimster), referring to Mr. Kirkham's question as to the power required in a gas-engine to work an exhauster and scrubber, &c., said he thought he would have ample power for driving an exhauster, pumping water for a tower scrubber, and working a rotary scrubber, with a 3½-horse Otto engine, with a usual consumption of gas, of 50 cubic feet per hour—1200 cubic feet a day. So far as his own opinion went, there was no comparison between a rotary and a tower scrubber. The former was by far the more efficient and the more valuable appliance. Of course, his tower scrubber might be different from others. He had to work his liquor in it over and over again, till he got the strength he wanted, and then change it. Between the condenser and the rotary scrubber he worked clean water in at the front end, and the liquor, in passing through generally came to from 4° to 6° Twaddel. Then he ran the tower scrubber till he had liquor of from 12° to 14° strength; and they all mixed together in the tar-well, and he made capital liquor, from which he got a good yield of sulphate of ammonia. Since he had introduced the rotary scrubber, instead of passing about 250,000 cubic feet per change, his purifiers went for perhaps 600,000 and sometimes 700,000 cubic feet. He had passed even close upon a million cubic feet through, according to the season of the year. He used to look upon 250,000 cubic feet as an extraordinary quantity to pass without change. Of course, he changed when required. He got an idea of when he should be looking for it; but now, instead of looking for the time when he had passed about 250,000 cubic feet, he never troubled until about 500,000 cubic feet had passed, the effect of the rotary scrubber was so manifest.

Mr. Reid closed the discussion by thanking the speakers for the gratifying way in which they had received his paper.

A NEW STREET GAS-LAMP.





The street gas-lamps in use to-day all seem to have sprung from one root in the matter of design. Looking at even the newest types (leaving out of consideration the so-called arc lamps), one is struck by the strong family likeness—the features of the primitive square lamp can be traced in all the developments that have been made. But there have been attempts on the Continent—and one or two have been successful—to strike out into something that is really new, and, in doing this, to secure a lamp which should have the merit of simplicity, both in construction and use. We are able to introduce one of these lamps to our readers this week, as it is about to be placed on the English market, by Messrs. A. and E. Cohen, of 2, Bury Street, St. Mary Axe, E.C., under the title of the "Acme." This new arrival is of German origin; and it is now in use in Cologne and several other towns on the Continent. It is a testimony to its popularity to learn that the works which have only been specially established about three months for manufacturing these lamps are already turning out something like 400 a week, and the output is still on the increase.

Now if the reader looks at the illustrations which depict a plain form of the lamp (of course, ornamented designs can be had if desired), the first thing that will commend itself to him is the small amount of glass that has part in its structure. All that there is in the new lamp is a plain cylinder of thick and tough glass; and this is merely stood, without putty or clips, in a support with a glazed bottom, being held firmly in position by an ordinary wind-proof ventilator at the top. The construction of the lamp will be clearly seen by a little study of the illustrations. There are two arms proceeding from a strongly made base, which uphold the canopy over the lamp; and in these two arms one finds certain points of interest. In the first place, they stand well out from the lamp; and this we are told obviates all shadow—in fact, the lamp is claimed to be a perfectly shadowless one. Even if it were not, the shadow which would be cast, when the lamps were fixed at the edge of the pavement, would simply take the line of the kerb, and therefore would not be a very great disadvantage. But apart from this, the outstanding form of the arms enables the lamp to be made with a large protecting canopy, the underside of which serves as a reflector; and altogether this feature in the construction contributes to giving the design a strong and imposing appearance. But the arms also serve another purpose. It will be remarked, on examining the drawing, that they are telescoped at the top—the head of the lamp being fitted on to the inner tube; and this inner tube, at about half-way of its length, is hinged, so that (as seen in the side view) the head can be lifted up and thrown back to the point at which it is supported. This is sufficient to allow of the cylindrical glass being lifted out for cleaning, and it has the additional advantage that it leaves, on the removal of the cylinder, the burner and mantle perfectly free for attention by the man in charge of the lamps. Perhaps the word "advantage" should be qualified by adding in "clement weather," because the ordinary type of street-lantern undoubtedly affords some protection to the mantle and burner during the cleaning operations in rough weather. However, perhaps there is something that can be said on this point from Continental experience.

There is another feature which needs explanation. It has been mentioned that the bottom of the lamp is glazed; and the reader will be curious to know how the lamp is lighted. There are two ways. In the first place, holes can be formed in the bottom for the accommodation of chains controlling a bye-pass lever, or the bottom may be so constructed that one half of the circle slides over the other half, and thus the lamplighter can readily insert his torch for the operation of an ordinary bye-pass burner. It seems to us, however, that a bye-pass, or some other igniting device, must always be used, as there is little room for the rough passing of a torch in the annular space formed by the chimney and the exterior cylindrical glass. But with the lever-and-chain arrangement, there can be no difficulty whatever. Speaking of the closed bottom, it may be said that the air supply is admitted at the head of the lamp; so that air which is taken in by the burner must be well warmed by its passage down the annular space, and perhaps (we do not give it as an absolute fact, but merely as a suggestion) this may have something to do with the high luminosity obtained by the use of an incandescent burner in this lantern.

Independent persons who have seen these lamps in use on the Continent speak highly of them—both as to their appearance and their lighting effect. They are certainly novel and attractive looking; are well and strongly made; and the cost is comparatively moderate. As to repairs, glass replacements (which ought to be very rare) will be quite inexpensive; and the simplicity of the lamp throughout should make the outlay on its upkeep a matter of small consideration. The labour entailed in its repair, too, cannot be so much as in the case of a puttied or other form of lamp in which the glass has to be fixed; and, the glass being cylindrical, it presents very little surface to the wind and to other damage, wilful or accidental. It is certainly a radical departure in street-lamps, and has many good points about it which commend it to the practical mind.

DELLWIK-FLEISCHER WATER-GAS PLANT AT NUREMBERG.

The following particulars of the installation and working of a water-gas plant on the Dellwik-Fleischer system are taken from a communication by Herr Haymann, the Manager of the Nuremberg Gas-Works, in a recent number of the "Journal für Gasbeleuchtung."

It having been found that the Nuremberg Gas-Works were becoming too small for the increasing demands—the first three months of the year 1900 showing an increase of 23·3 per cent., and the gasholder capacity being only 43 per cent. of the maximum day's consumption—it was resolved, in April, 1900, to take steps for the installation of a water-gas plant. The Dellwik-Fleischer system was chosen; and the plant was to have a productive capacity of 21,200 cubic feet per hour. It was ready on the 4th of December, 1900, and continued to work till the 11th of March, 1901, without any serious interruptions. The chief requirement of producing 21,200 cubic feet of gas per hour was fulfilled. The coal-gas works were considerably relieved; and at times when the consumption was greatest, a sufficient quantity of

gas could always be delivered, notwithstanding the small amount of gasholder room.

The whole installation is crowded into the smallest possible space. It comprises a 21,200 cubic feet per hour generator for the consumption of coke, with the necessary fittings, gas and air valves, reversing gear, and complete blast, gas, and steam pipes. The generator is lined with best quality fire-bricks, and has its grate 30 inches from the ground. The scrubber is 6 ft. 6½ in. in diameter, and 19 ft. 8 in. high, is filled with coke, and equipped with the necessary fittings, water-valves, inlet and overflow cocks, and a sprinkler. There is also a blower of 4950 cubic feet per minute capacity, and a horizontal engine of 26-horse power. The relief gasholder has a wrought-iron tank, and is of 4240 cubic feet capacity. There are also the working connections, valves, pressure-gauges, pipes, and a coke-elevator, &c. Purifying plant and meters were not erected.

The carburetting plant, which had to be accommodated in the meter-room, comprises a wrought-iron benzol reservoir on the Munich system, and a vapourizer on the Leybold system for vaporizing 190 lbs. of benzol per hour. Here also are a pump, benzol and benzol vapour pipes, valves, &c. On starting work with the water-gas plant, the benzol carburettor has to be warmed for about three-quarters of an hour before gas-making begins, and the benzol gas outlet must be opened. The water for sprinkling the scrubber has to be turned on, and gas making must not commence till the water overflows at the seal-pot. The scrubber outlet valve has to be opened, and the safety valve between the scrubber and generator has to be filled with water to a depth of about 4 inches. All the doors of the generator must be closed, the blast-valves on the generator must be opened, and the gas-valves turned so that they are shut. They must be locked after each run. The generator is then charged with coke, the engine is started at full speed, the blast-valves are opened, and the blow is begun. The blow lasts two minutes.

When the blow is stopped, the blast-valve is shut. After the gas-valve has been opened, the steam-valve is turned on slowly, until the pressure gauge indicates a pressure in the generator of 12 to 14 inches. After the steam-valve has been opened, the test-flame is lighted, and gas-making proceeds for 5 or 6 minutes, according as the test-flame towards the end of the run is more or less vigourous, or whether it burns blue or goes out. Then the generator valves are again lifted, and the working goes on in the same way as just described. Therefore, in an hour there can be 7 or 8 runs; and in each run 2470 to 2820 cubic feet of gas are produced. Recharging takes place as a rule every hour with 8 to 10 cwt. of coke. The generator has to be clinkered every five or six hours. It is advisable before clinkering to make two upward runs, at a time when the generator has not just previously been recharged, in order to let it cool down a little in its lower layer. During clinkering, the generator valves must be open. After clinkering, the generator doors are closed, and the ash doors below them are opened and the ashes removed. If the generator is sufficiently full of coke, gas making can then be begun again. It is quite possible to regulate the quantity of gas produced by letting in much or little steam.

The gas is cooled in the scrubber to about 59° Fahr., and passes into the relief gasholder. The outlet pipe of the relief gasholder is connected with the works' main, which conveys the coal gas from the settings to the condensers by a valve which can be closed. The exhauster pulls the water gas from the relief gasholder; and according as the valve is more or less opened, more or less water gas is added to the coal gas. The water gas goes along with the coal gas through the condensers, tar-extractors, washers, purifiers, and meters. The gas is carburetted after going through the meters, and passes into the gasholders. It did not appear advisable to add more than 20 per cent. of water gas to the coal gas, having regard to the use of the gas for gas-engines. Testing the heating value of the gas gave an average calorific power of 77½ calories gross, 73·7 calories net, per cubic foot.

Three workmen are regularly employed on the plant; and if a reserve man were dispensed with, two would amply suffice. Therefore, five or six men can produce 423,600 cubic feet of gas in twenty-four hours. To produce 494,200 cubic feet of coal gas, 40 to 45 retorts must be in action, and at least ten men be employed. It should be noted here that on some days—Saturday, Sunday, Monday—there was often no water gas made, and on many days only for a few hours. During the working period named—Dec. 4, 1900, to March 11, 1901—there were produced, in round numbers, 10,500,000 cubic feet of water gas.

The cost of producing simple water gas—including generator and boiler fuel, wages, condensing water, lubricant, waste, and lighting—was 10·42d. per 1000 cubic feet. In computing this cost, coke has been taken at the price of 30s. per ton. The cost of carburetting the water gas with benzol to an illuminating power of 14·5 candles, was 11·08d. per 1000 cubic feet, taking benzol at about 16s. 10d. per cwt. The consumption of benzol per 1000 cubic feet was 99⅓ oz. The cost of the carburetted water gas was consequently 1s. 9½d. per 1000 cubic feet. Taking interest at 4 per cent., and writing off 8 per cent. from the capital outlay of £4370, the gas has to be charged with 3d. per 1000 cubic feet; and the total cost of production per 1000 cubic feet of carburetted water gas amounts therefore to 2s. 0¾d. [In this calculation, no account appears to have been taken of the increase in volume consequent on the addition of benzol vapour. —Ed. J.G.L.] It will therefore be seen that carburetted water gas is not cheaper than coal gas in large works, and the limit of the addition of 20 per cent. is a very narrow one. For if in twenty-four hours only 1,059,000 cubic feet of coal gas are produced, or 42,360 to 45,890 cubic feet per hour, only 8825 to 9180 cubic feet of water gas per hour can be added, which means that the plant and working power are only being half used. It should be observed that the plant was often working for only a few hours each day. With constant working, expenses would decrease.

In a subsequent communication, Herr Haymann states that further experience of the plant has shown even more favourable results. After running, as already mentioned, for 57 days up to March 11, 1901, it was shut down until the 1st of November; and the working results from that date to the close of the year, covering 42 days actual use, are now published. The cost of the gas diminished, as to simple water gas to 8·6d., and as to carburetted water gas to nearly 1s. 4d. per 1000 cubic feet during November, 1901; while during December the cost was 7·8d. and 1s. 3·2d. per 1000 cubic feet respectively. The consumption of benzol per 1000 cubic feet of gas carburetted was reduced to 83½ oz.; while the benzol was obtained at the much cheaper price of 13s. 2d. per cwt. Economies in wages were also effected, as the men, by practice, had become more capable. The consumption of coke per 1000 cubic feet of water gas was 41 lbs.

The average percentage composition of the simple water gas was: Hydrogen, 50·8; carbonic oxide, 37·4; marsh gas, 0·8; carbonic acid, 5·2; nitrogen, 5·2; oxygen, 0·6. It had a specific gravity of ·54, and a net calorific power of 71·7 calories per cubic foot. The mixed gas, as distributed, had the following average percentage composition: Hydrogen, 51·7; marsh gas, 29; carbonic oxide, 9·9; olefines and benzene, 4·1; carbonic acid, 2·5; nitrogen, 2·2; oxygen, 0·6. The mixed gas had a mean specific gravity of ·462, an illuminating power of 14½ candles, and a net calorific power of 135½ calories per cubic foot. The average quantity of water gas in the mixture was 8 per cent.; and no complaints were received from consumers using it for gas-engines.

The great advantage that water-gas plant affords, of capability of producing a large quantity of gas at very short notice, was again fully realized. After being idle for seven months, a fire was started in the generator on the 1st of November, and in 1¾ hours' time, 21,200 cubic feet of gas could be made per hour, or as much as 48 coal-gas retorts would produce. The economy in time, furnace fuel, and wages consequently becomes very great. The quantity of gas made can readily be controlled by altering the amount of steam admitted to the generator; but, naturally, the consumption of coke per 1000 cubic feet of gas made increases when less than the normal output of the plant is being obtained. Frequent interruptions of working also increase the working charges; and continuous work would result in a very much lower productive cost than has been attained at Nuremberg. The longest period of continuous work commonly experienced there has been some 14 or 15 hours.

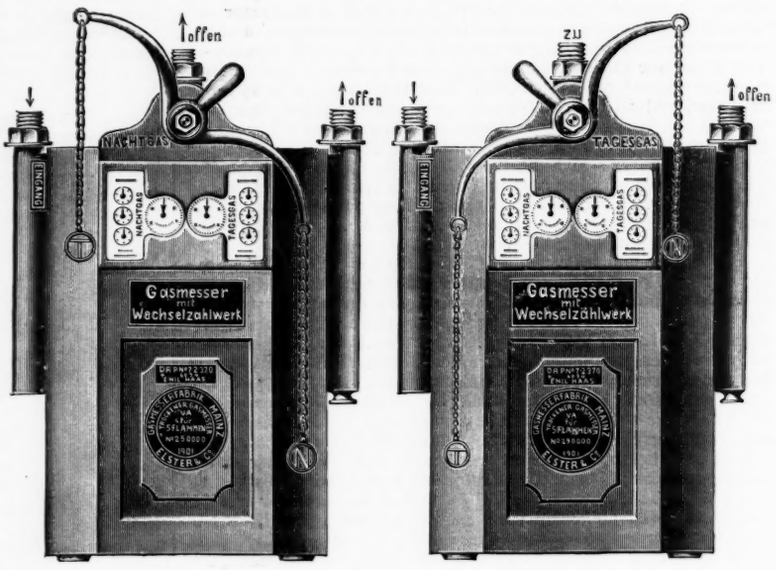
A new gas-works is now being erected by the Nuremberg Corporation. Large increases in the consumption in 1899 and 1900 led up to an estimated output of about 565 million cubic feet in 1901; and the old works, even with the aid of the water-gas plant, could only just be expected to meet the maximum day's requirement. Having regard to these facts, and the anticipation that the new works would not be ready for manufacturing till the autumn of 1904, it was decided to erect at once, on the site of the new works, a two-lift unhoused gasholder of 1,550,000 cubic feet capacity, and a new water-gas installation, also on the Dellwik-Fleischer system, for an annual make of 180 million cubic feet. The gasholder was finished and brought into use in November last. It is connected both with the old works and the distributing system by a 40-inch main. The storage capacity now amounts to 90 per cent. of the maximum day's output, instead of 38 per cent. as formerly.

The new water-gas installation, though not yet put to work, comprises two detached buildings and a relief gasholder of 35,000 cubic feet capacity. One of the buildings contains two boilers (each with 1075 square feet of heating surface, and with the Kudlicz grate), two generators, two sets of condensers, two fans, and two exhausters. These are for a productive capacity of 12,400 cubic feet per hour. At one end of the building is a gas-engine, for either coal gas or water gas, which drives an electro-motor for the electric lighting of all the buildings, and an electric elevator for raising the coke into coke-bunkers placed over the working plant. A battery of accumulators is housed in an annexe. The other building contains purifiers, revivifying floor, station meter, governors, and workmen's accommodation. A laboratory is also to be fitted up here later.

The old water-gas plant is to be transferred here in the course of this year, and a fourth generator will subsequently be erected. The installation will then be capable of producing 67,000 cubic feet of gas per hour. The water-gas plant is intended at present to assist the old coal-gas plant; but when the new coal-gas works are in operation, it will be partly utilized for the supply of gas-engines for generating electric energy for furnishing light and power on the works, and partly kept in reserve as an auxiliary to the coal-gas plant.

Mr. A. Melville Watt, who was for many years Secretary and Treasurer of the Montrose Gaslight Company, and for forty-three years Burgh Treasurer, died in Aberdeen last Thursday.

A GAS-METER WHICH REGISTERS SEPARATELY NIGHT AND DAY CONSUMPTION.



At last year's meeting of the Bavarian Association of Gas and Water Engineers, Herr L. Haas, of Mayence, read a paper on "Day and Night Meters," which has just been published in the columns of the "Journal für Gasbeleuchtung."

The author started by saying that for many years the managers of gas-works had endeavoured to equalize the day and night and the summer and winter consumption of gas. The increase in the day or in the summer consumption of gas could only be brought about by a reduction in the price; and therefore in most German towns a lower price for gas for non-illuminating purposes prevailed. The differential prices, however, necessitated the use of special meters, which either registered the consumption as independent meters, or else worked as differential meters in connection with a meter which measured the total consumption. Either of these alternatives was objectionable to the consumer, because he had to find room for, and to pay for the hire of, two meters, and was likewise objectionable to the gas undertaking, because the reading had to be taken in two places, and in many cases a calculation had to be made. A large number of extra meters had also to be provided. To overcome these difficulties, special meters had been constructed during the last few years, registering the day and night consumption on separate indices.

These meters were of two kinds. The first was so constructed that one of the two indices was always connected with the driving spindle of the meter, while the other index could be thrown in or out of gear by opening a cock either by hand or by clockwork. These were known as "gas-meters for day and night gas, with double indices." They had, however, the serious drawback that the reading of one index had to be subtracted from the other to arrive at the actual consumption. This proceeding involved, in any case, a waste of time, and was likely to cause mistakes. The second kind of meter was so constructed that both indices could be thrown by turns in or out of gear. This variety, as hitherto made, had a leather bellows-like bag in the upper part of the meter, which was distended by a rise in the gas pressure, and by suitable transmitting levers set one or other of the indices in or out of gear. These meters being dependent on the gas pressure, had not been largely adopted in practice. As, however, each of the indices showed separately the day and night consumption, no subtraction was required, and mistakes were avoided and time saved. In contradistinction to the aforementioned class of meters with double indices, the second class were called "gas-meters with alternating indices for day and night gas."

Herr Haas described a new gas-meter [here illustrated] with alternately acting indices, made by the firm of Elster and Co., of Mayence. At the top of the meter was a second outlet for the gas for illuminating purposes; while the usual outlet was for the gas consumed by day. The second outlet was opened and closed by a lever clock, whereby the driving spindle of the meter was connected with the one or other index. If the consumer required gas for lighting, he had to press down the lever on the left, which opened the tap and put in connection the index on the left. While the tap was in this position, the consumer might take a supply at night of the so-called "day" gas for heating through the other outlet, which was always open. The consumption, however, of both illuminating and heating gas was, in such a case, shown together on the index for illuminating gas, charged at the higher price. It was claimed that this higher price was justified, because the gas-works had no interest in supplying gas at a lower price for non-illuminating purposes during the time gas was wanted for lighting. If the consumer required gas for heating only, he had to close the lever cock by drawing down the lever on the right, which brought into action the index on the right and threw out that on the left. In this position, the consumer could not obtain any gas for lighting. The gas for heating was registered on the index on the right, and was charged at the lower price.

To distinguish more easily between the two indices, the figures on that for heating or "day" gas were in red, while the figures on the other were in black. The extremely simple construction of the meter did not permit of both indices being thrown out of gear at the same time; one was always, of necessity, connected with the driving spindle. This meter possessed many advantages which should tend to facilitate its introduction, such as: The slight additional cost of about £1 for each meter, the possibility of converting any ordinary meter into a day-and-night meter, convenience in reading the indices, avoidance of errors in reckoning the difference in the readings of two meters, ease in fitting to the separate lighting and non-lighting services (which are now universal in Germany), and the possibility of having differential prices for the gas. A patent has been granted for the meter in Germany.

THE PREPAYMENT METER SYSTEM IN SLIGO.

By C. B. Tully, of Sligo.

[**A Paper Read before the Irish Association of Gas Managers.**]

It is the ambition of all of us to see our sales of gas increase steadily from year to year, and we are anxious to do all in our power to promote and encourage the use of gas. In the prepayment meter, the incandescent burner, and the cooking-stove, we have means at our command of increasing the consumption of gas practically to any extent. The incandescent light not only enables us to knock out electric light, but to compete on equal terms as to cost with our greatest competitor, the oil-lamp.

The prepayment meter was introduced into Sligo early in 1883, and was supplied and fixed free of charge, with all the necessary fittings, and furnished with best governor burners; the meters then being rated at 15 cubic feet for 1d. This was continued for a few years; but the progress made was slow and the business unsatisfactory, as it was found that several consumers, after a short trial, reverted to oil lighting. In 1886, the rating was increased from 15 to 18 cubic feet; but this did not improve matters materially. In the summer of 1887, cookers were supplied and 20 cubic feet given where these were used. This, with the assistance of a gas exhibition, gave the business a good spurt, which is steadily continuing.

Some eighteen months ago, a personal inspection and investigation was made into the prepayment meter business. It was found that consumers with the cookers and lights (at 20 cubic feet) were perfectly satisfied, and used gas for lighting exclusively; but that consumers with lights only, in the majority of cases, used oil and gas, the consumption in some instances being as low as 1000 cubic feet per annum. The conclusion arrived at was that gas lighting with the ordinary burner, at 18 cubic feet for 1d., was found too expensive by the average consumer. To remedy this, it was decided to make an experiment on a number of the worst cases, by supplying and fixing, free of charge, incandescent burners in combination globes.

After a trial of three months, these consumers were again interviewed, and their fittings inspected; and in all cases the results were satisfactory. The consumers expressed themselves pleased, and were satisfied that they had a cheap and good light, with the result that they are advertising the business among their friends, and the applications for installations are very numerous. It may be mentioned that the Company send round a competent man to inspect and clean incandescent burners and globes monthly, free of charge, and supply mantles and chimneys at cheap rates.

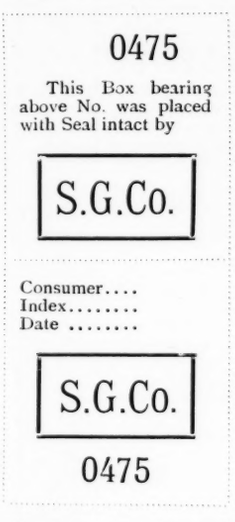
There are 255 prepayment consumers, of whom 60 are rated at 18 cubic feet for lights only, and 195 at 20 cubic feet with cooker and lights. The consumption for 1901 averaged 6800 cubic feet for the 18 cubic feet meters, and 12,600 cubic feet for the 20 cubic feet meters. The ordinary price is 4s. 5d. for lighting and 2s. 11d. for cooking, heating, and motive power. The consumption of gas during the summer months in the 18 cubic feet meters is practically *nil*, whereas those with the stoves at 20 cubic feet burn nearly the same all the year round. The consumer pays more for his cooking gas during the summer, but gets the advantage of cheaper gas during the winter for lighting.

The average cost of the installations, including fittings, service, and meter, is £4 without a stove, and £6 4s. 3d. with it. The

slot cooker costs £1 9s. 3d., and pipe and fixing 15s. But the majority of consumers prefer to take the ordinary cooker and pay the hire rate extra; and, contrary to expectation, there is no difficulty in the collection of this rent. No hard-and-fast rule is made as to the number of lights allowed, or the length of pipe supplied, and, where advisable, incandescent lights, in combination globes, are fitted free of charge. Applications are received on the Company's printed form; and in each case the premises are inspected and reported upon before being fitted up.

The boxes are collected monthly, and the collector at the same time cleans the incandescent burners and globes, and supplies, for cash, mantles, &c., where requested—the collector being paid a commission on all goods sold. The mode of collection is new and on its trial at Sligo, and, so far, has proved satisfactory. In place of the ordinary cash-box with the open top, there is used a box having a funnel-shaped top, with a suitable slot for the reception of the coin; so that, when once the coin is in the box, it can only be removed by breaking the seal or adhesive label which secures the discharging door. The labels are numbered, and space is provided on them for particulars, as shown in the specimen.

Another label is used to attach the cash-box to the meter. The collector is supplied with a coin cart such as is advertised by Messrs. Sawer and Purves, and a boy to push it. The cart conveniently holds 100 cash-boxes and a supply of incandescent accessories. The collector has simply to remove the full box and write on the label the consumer's name, number, date, and index, and replace it by an empty box, attaching the latter to the meter by the adhesive label, and locking it up in the usual way. The full boxes are returned to the office and put by until they can be conveniently emptied and the coin counted by two responsible officials.



It has been found advantageous to make frequent inspections and collections (at least once a month) and to inquire into any cases of small consumption, and, if possible, to remedy them. The collector at the same time canvasses for orders for coke and new business; and he can do this and collect 60 boxes per day. But if he has simply to collect the boxes, 100 is considered a day's work. This system of collection has many advantages over the ordinary system. Besides being a check upon the collector, a less responsible official is required for the purpose, and less annoyance and inconvenience are caused to the consumer. Another advantage is that the consumer does not see the amount of money collected and grumble at the cost. The boxes are interchangable, the same box being used for all makes of meter; and they are supplied at about 8d. each. The cost of altering the existing meters to take the box will vary with the number to be altered and the make of the meter, but will amount to about 1s. per meter. Meters introduced after the adoption of this box can be supplied by the makers without any extra cost.

Most of the prepayment meters now on the market are correct and satisfactory. Notwithstanding this, occasionally the coin will be found short. Then the question arises: Is it the meter, the collector, or the consumer? It is possible to test the meter as far as its mechanism is concerned; the collector cannot be checked within 100 cubic feet, or (say) 5d.; and the consumer, if dishonest, may manipulate the lock or "fake" the meter in some way or other. Among the three it is very annoying; and it is sometimes impossible to say where the discrepancy may be. Any system that will check, or render difficult, pilfering or dishonesty would be a boon to gas managers.

One disadvantage in the slot cooker is the liability of the gas going out in the oven for want of coin (or rather gas) and the consequent liability there is to explosion. Several explosions have occurred—some with more or less serious results. Of course, it may be said that the consumer should watch the hand of the meter, and see that it is well supplied with coin before cooking operations commence; but from experience we know that the hands, dials, and indices of a gas-meter are a complete mystery to the average consumer. Invariably the slot consumer waits until the lights are on the point of going out before he thinks of putting a coin into the slot, with the result that the incandescent lights light-back, and damage is done to the burners and mantles, causing complaints and dissatisfaction.

Messrs. Browne and Gilgan have invented an alarm attachment for prepayment meters, to overcome this difficulty. Two of our meters have been tested and experimented upon for some time, with satisfactory results. The turning of the handle to insert the coin winds up the alarm, which can be set to ring at any desired time before the gas supply is cut off and the lights or the cooking-stove extinguished. To overcome the obvious difficulty arising from the meter being fixed in an out-of-the-way place, such as an underground cellar or coal hole, or in a position where slot meters, for the convenience of the consumer (not to mention the collector) should never be fixed, the meter is fitted with an electric alarm; the bell being fixed in any convenient position. The alarm attachment undoubtedly fills a long-felt want, and removes a serious objection to slot cookers. The alarm attachment can be fitted to any make of meter.

Discussion.

The PRESIDENT (Mr. S. B. Langlands), opening the discussion, thought Mr. Tully was ahead of most of them in his ideas.

Mr. J. RICHMOND (Kilkenny) said those who had experience with prepayment meters would bear him out in saying that anything which had a tendency to make tampering less possible was of great benefit. He had found various instances of tampering with prepayment meters. Mr. Tully's system seemed to be very secure. The having of a duplicate money-box he considered would be a very great advantage. It was much handier to the gas company, and would be no annoyance to the consumer. He did not know if it was any advantage to refrain from letting the consumer know what was in the money-box; he thought it might be better to count the money before the consumer. He had had experience of a system which was giving satisfaction, but which seemed to be somewhat more expensive than Mr. Tully's.

Mr. D. W. SYME (Naas) said he had an agreement with consumers, which they signed, as to the safe custody of the cooker and the meter, and also that they would be responsible for the amount indicated by the index proper of the meter. He found that this worked satisfactorily. He never trusted a man at all; on the last day of each month he went round and collected the money himself.

Mr. T. J. REID (Ballina) said that the judgment shown by Mr. Tully seemed to him to be a very good one, so far as the money was concerned; but he would like to know how it worked so far as the consumer was concerned. Had he any quibble at the money being taken away? Suppose the consumer put in too much money, how did he come out of the bargain? Did he not question the new arrangement?

Mr. S. A. SCRIVENER (Dublin) asked, in the event of a consumer opening a box and taking away part of the contents, upon whom the loss would fall; and if the consumer said that the box was sealed, and he had nothing to do with it, would they have any claim upon him?

Mr. F. EUSTACE (Tullamore) raised the question of whether, if a consumer had put in (say) 2s., and had only consumed 2d. or 3d. worth of gas, how did they account to the consumer, the box having been taken away?

Mr. G. AIRTH (Dundalk) said he got a prepayment meter some little time ago which went a complete round without any money being put into it. Who, he asked, was responsible to make good the money?

Mr. J. G. TOOMS (Waterford) thought the subject was an interesting one. He would like to know what the majority of the members, and Mr. Tully too, thought of a shilling meter. In his opinion, it was better, where the price of gas was rather high, to fix a shilling meter for cooking-stoves, wherever possible, because he found that a large number of consumers preferred shilling meters, and he was fitting in some now. He considered Mr. Tully's money-box a very good idea; and he imagined it would be applicable to most gas-meters. He did not think it was wise to make consumers sign agreements that they would be responsible for this or that, because the mere fact of asking them to sign was enough to frighten some people—people who might otherwise be inclined to try a cooker. He only asked a consumer to sign a simple acknowledgment. He had never had any difficulty, till now, in any case of shortage, in recovering the money.

The HON. SECRETARY (Mr. J. Whimster) said that, so far as he was concerned, he had not regarded prepayment meters of much importance in themselves for leading consumers to use gas; and he must say that he had not pressed them. Any prepayment meters he had supplied had been asked for; and, of course, his experience with them had been very variable. Some of them had done very well; some of them had done but ill. With reference to what Mr. Tooms had said, he did not think it was right to be hard and fast with consumers. He set himself to have the indices taken and the money removed once a month; and if there was any deficiency, well, he just changed the meter, and never asked the people to pay—he did not think it worth while. To do otherwise would be to create suspicion as to prepayment meters; and he thought that was not wise. He found that when a prepayment meter was put into a house, and was used for a year or two, if the consumer went to another house where there was no prepayment meter, he was put on the ordinary list; and in that way the number of ordinary consumers was increased through prepayment meters. But he never pressed a prepayment meter; and he supposed he had only about sixty in use.

Mr. TOOMS said he found prepayment meters very handy in cases of arrears. Whenever he cut off a consumer, he gave him a prepayment meter, set to a very small quantity, in order to collect sufficient to pay off the debt. That was better than law proceedings.

Mr. KIRKHAM: Is that with the consumer's consent?

Mr. TOOMS explained that it was understood by the consumer that, unless he agreed to take gas at the rate of about 1d. for 15 cubic feet, the gas would be cut off.

Mr. EUSTACE: The consumer, of course, is quite satisfied with that arrangement?

Mr. TOOMS said that the man might be in business, and the question was to either pay a bill of, perhaps, £6 or £12, or have his gas cut off; he had the option of paying it off by taking a prepayment meter.

Mr. TULLY, in reply to Mr. Reid, said that he never gave a consumer through a prepayment meter any receipt, or any information, unless he asked it, about the amount of money in the box. He found that very few consumers took any interest whatever in regard to the matter, unless they actually saw the pile of coppers upon the kitchen table—and then they grumbled that they did not think it was so big. The box got over that difficulty. In regard to tampering with the label, the instructions he gave to the collector were that when he found a box which had been tampered with, he was to lock it up; but so far he had not had any difficulty in this respect. With regard to money being overpaid at the time of the collection, of course, they took all that was in the box. In the first place they saw that the meter was correct, and if there was any money over, they returned it; if it was short, which very seldom occurred, they put up with the loss. If a consumer put in 2s. and only consumed 2d. worth of gas, they returned the difference. If they found bad money in the boxes, they sent it to the consumer, with a note; and they never had any difficulty in getting good money for it. They had had a few cases. He himself preferred shilling to penny meters; but he found that a majority of the consumers preferred penny meters. He supplied both. The idea of this attachment to the meter was not his own. It originated with his Chairman, and, of course, he had worked it out. He agreed with what Mr. Whimster had said with regard to coin being short. The box was patented, both in England and in America.

THE JACKETED CLAUS KILN AT GRANTON.

In the report of the Chief Inspector under the Alkali, &c., Works Regulation Acts (Mr. Forbes Carpenter) for the past year, some extracts from which were given in the "JOURNAL" last week, and others appear to-day, he alludes, in the course of his report to the Secretary for Scotland, to the starting of the new residuals works of the Edinburgh and Leith Gas Commissioners at Granton, where large plant has been erected in which the foul gases evolved in the manufacture of sulphate of ammonia are dealt with by a modification of the Claus process. Mr. Carpenter says the principal interest last year, so far as his special work in Scotland was concerned, centred in this event. Through the courtesy of Mr. W. R. Herring, M.Inst.C.E., the Engineer to the Gas Commissioners, Mr. Carpenter's Assistant (Mr. Linder) was enabled to make a careful study of the reactions on the large scale of working to compare with those obtained in the laboratory, as described in his chief's report for the year 1899. Mr. Carpenter says the results are highly encouraging, although it cannot yet be said that every detail of plant is perfect and adequate to the duty expected of it. The main feature of the apparatus, the Claus kiln, only requires sufficient heat in the jacket and in the annular space in the centre, in order to decompose an extremely satisfactory percentage of the sulphuretted hydrogen passing to it, dilute as this is.

Controlling Factors.	Jacketed Claus Kiln.									Gases leaving Sulphur Chamber.							Efficiency.			Entering Coke Fire. Sulphur as H_2S.	Entering Chimney.		
	Temperature Deg. Fahr.			Air Supply.			Saturator Gas Entering.			One Cubic Foot contains.			Sulphur in Grains.				H_2S Per Cent. of Total Entering.				One Cubic Foot contains.		
	Jacket.	Contact Substance.		Method.	Per 100 Volumes of Gas.		100 Volumes contain.			Sulphur Grains.		CO_2 per Cent.	Per Cubic Foot of Saturator Gases entering Kiln.				Oxidized.		Escapes.		Sulphur Grains.		Total Acidity as SO_3.
	Furnace Gases Enter at.	At Point One Foot below Surface.			Admitted. Calculated from Per Cent. CO_2, H_2S in Gases Entering and Leaving.	Required by Theory in Addition to Air Entering with H_2S, CO_2 for Reaction.				As H_2S.	As SO_2.		As H_2S.	As SO_2.	As Free S and possibly other Forms (by diff.).	Total.	To SO_2.	To Free S, &c. (by diff.).	As H_2S.		As H_2S.	As SO_2.	
	Deg. F.	Inlet Gas and Air. A.	Opposite Side. B.			$H_2S + O = H_2O + S$.	$H_2S + O_3 = H_2O + SO_2$.	H_2S.	CO_2.											Grns. per Cub. Ft.			Grns.
A.—*Temperature*—									*x.*			*x.*											
(*a*) Jacket—	515	195	210	Fan and chimney	166	3·8	38·5	6·94	79·6	8·7	1·6	30·9	22·62	4·16	16·66	43·44	9·58	38·35	52·07	7·7	1·64	0·10	4·35
(i.) Two stills	(Average of three series of tests.)																						
	395	570	280	Chimney	46	10·0	48·0	7·60	83·4	7·2	5·6	61·0	9·72	7·56	30·30	47·58	15·89	63·68	20·43	7·5	0·50	0·20	1·75
(*b*) Contact substance (as affected by large increase in air supply)—	470	245	220	,,	208	10·1	46 0	7·35	84·2	7·5	1·6	27·8	22·50	4·80	18·71	46·01	10·44	40·66	48·90	3·9	0·27	1·09	3·40
(ii.) One still	(Both the average of two series of tests.)																						
	326	330	268	Chimney	47	11·5	48·0	7·30	86·0	13·2	2·1	61·2	18·48	2·94	24·28	45·70	6·43	53·13	40·44	6·5	0·68	0·61	3·23
B.—*Supply of Air*—																							
(*a*) Increase in air supply already excessive—	515	195	215	Fan and chimney	248	17·4	57·9	8·10	89·0	7·7	1·4	26·0	26·18	4·76	19·76	50·70	9·40	39·00	51·60	..	..	..	..
(i.) Two stills	515	195	215	,,	308	13·5	50·5	7 43	87·4	8·3	0·9	21·6	33·61	3·65	9·25	46·51	7·90	19·80	72·30	7·7	1·64	0·10	4·35
(ii.) One still	470	245	220	Chimney	166	8·0	45·0	7·30	82·7	8·4	1·6	31·7	21 84	4·16	19·70	45·70	9·10	43·11	47·79	3·9	0·27	1·09	3·40
	470	245	220	,,	264	11·5	48·5	7·40	85·6	6·7	1·6	24·0	24·12	5·76	16·44	46·32	12·44	35·49	52·07	..	..	..	..
(*b*) Increase in air supply, already well balanced—	395	570	280	,,	46	10·0	48·0	7·60	83·4	7·2	5·6	61·0	9·72	7·56	30·30	47·58	15·89	63·68	20·43	7·5	0·50	0·20	1·75
(i.) Two stills	..	500	250	,,	69	16·6	55·9	7·85	89·2	6·4	5·2	55·2	10·20	8·32	30·62	49·14	16·93	62·31	20·76	5·6	0·50	0·20	1·75
(ii.) One still	325	330	265	,,	39	12·5	49·5	7·40	86·6	14·3	1·8	65·3	18·59	2·34	25·39	46·32	5·05	54·80	40·14	7·0	0·23	0·87	2·75
	325	330	265	,,	56	10·5	46·5	7·20	85·3	12·0	2·4	57·0	18·00	3·60	23·47	45·07	7·99	52·07	39·94	5·9	1·12	0·36	3·70
C.—*Supply of Saturator Gas*—																							
100 tons liquor per 24 hrs.—One still	325	330	265	,,	39	12·5	49·5	7·40	86·6	14·3	1·8	65·3	18·59	2·34	25·39	46·32	5·05	54·80	40·14	7·0	0·23	0·87	2·75
200 tons liquor per 24 hrs.—Two stills	395	570	280	,,	46	10·0	48·0	7·60	83·4	7·2	5·6	61·0	9·72	7·56	30·30	47·58	15·89	63·68	20·43	7·5	0·50	0·20	1·75

CONCLUSIONS.

1.—That the temperature of the contact material in the kiln, within the limits of efficient reaction, is determined by the energy of chemical reaction, rather than by the temperature of the furnace gases circulating in the surrounding jacket.

2.—That the efficiency of the kiln—as measured by the amount of sulphuretted hydrogen oxidized, per cent. of total entering—is, within the same limits, determined by the temperature of the contact material, rather than by the relative proportions of air and gas in the reacting mixture, or by its rate of flow through the kiln.

Any increase in efficiency that might be looked for (*a*) from a large increase in the percentage of oxygen present in the reacting mixture, or (*b*) by prolongation of the time of passage of such mixture through the contact material, is far outweighed by the lowering of temperature induced in the latter by such alteration in the conditions of working.

It will be seen from the accompanying table, in which the results of the examination are set out, that when the jacket of the Claus kiln received the fuel gases leaving two steam-boilers—that is, when both ammonia stills were in operation—the percentage decomposition of sulphuretted hydrogen was at its best. Experience showed also that the distance of the Claus kiln from the end of the boilers is sufficiently great for very considerable loss of heat to be experienced in the spent fuel gases when one boiler only was in operation—such loss, in fact, being very much a constant quantity due to conduction and radiation combined.

When both stills were in operation, it was calculated that the volume of gases passing the kiln per unit of superficial area was conformable to that in the largest works in the country engaged in recovery of sulphur from alkali waste, and also was in harmony with the maximum speed that could be attained in the laboratory apparatus, and this without any indication that a still greater volume could not be decomposed under good conditions. The gases, after leaving the kiln, pass directly to the sulphur or "flowers" chamber, thence to a limestone tower to absorb residual sulphurous acid, and finally to a combustion furnace to destroy residual sulphuretted hydrogen. The tests "entering chimney" show that the latter apparatus does not completely fulfil its desired function.

The table is so complete as to require very little explanation. The air supply is calculated by means of the equation—

$$V = 100\left(\frac{x - x'}{x'}\right) + 1{\cdot}5\left(\frac{x'y - xv'}{x'}\right)$$

where V is the volume of air entering with 100 volumes of saturator gas, x y the amounts of carbonic acid and sulphuretted hydrogen respectively in that gas per cent., and x' y' the corresponding percentage amounts in the gases leaving the "flowers" chamber. The second factor on the right-hand side of the equation represents the reduction of volume due to chemical reactions; and may be safely disregarded when dilution is large.

Mr. Carpenter hopes in the course of the present year to continue the investigations, when certain modifications in the plant have been effected. He acknowledges the value of the services rendered by his Assistant in carrying out the experiments, of which the table presents only a summary. Mr. Linder's energy and skill enabled him to surmount successfully the numerous difficulties presented to the investigator.

RURAL WATER SUPPLIES.

The last paper with which we have to deal, to complete the record of the proceedings at the Leicester meeting of the British Association of Water-Works Engineers, is one on "Rural Water Supplies." It was the joint production of Mr. James Dewhirst and Mr. Horace G. Keywood; and it gave an account of what has been done in the Maldon and the Chelmsford rural districts in the matter of their water supply. The first-named district is under the charge of Mr. Keywood and the second of Mr. Dewhirst. We are only able to give the chief points of the paper and of the discussion which it evoked. The contribution deals first with the

Purleigh District Water-Works of the Maldon Rural District Council.

The district supplied lies to the south of the borough of Maldon and the River Blackwater, and comprises an area of about 6½ miles by 7 miles, including the parishes of Hazeleigh, Purleigh, Woodham Mortimer, Cold Norton, Stow Maries, Althorne, Latchingdon, and North Fambridge—the whole of the district being situated on the London Clay.

The population of the eight parishes is 2329, spread over an area of nearly 20,000 acres. The works were commenced in March, 1899, and completed in June, 1900. The Rural District Council took the responsibility of laying the mains without the intervention of a contractor. The supply and erection of pumping-plant, and the construction of the reservoirs and engine-house, were, however, carried out by contract; the whole of the work being designed by, and carried out under the immediate supervision of, Mr. H. G. Keywood. The mains were of cast iron, with spigot-and-socket joints, and amounted to a total length of nearly 26 miles. They were laid 3 feet deep, measured from the tops of the sockets.

The springs are situated in the parish of Woodham Walter, where there exists a bountiful and pure supply, as a report by Dr. J. C. Thresh shows. The land purchased was 10 acres; and the price, including the springs, was £600. The engine-room is 26 ft. by 13 ft., with a coal-store attached, and is built in brickwork and roofed with slates. The ground is of a treacherous nature; and the floor was, therefore, formed of cement concrete, 3 feet deep, with steel girders embedded therein. The chimney shaft is 25 feet high; the foundations for this being carried down a depth of 14 feet to the clay, so as to ensure a solid base.

For a steam pumping plant, the tender of Messrs. Owens and Co., of Whitefriars, London, was accepted. The plant consists of two vertical boilers and two horizontal duplex steam-pumps. The whole of the plant is in duplicate, and arranged so that either boiler will supply steam to either pump. The boilers are 8 ft. 6 in. high by 3 ft. 6 in. diameter, fitted with three cross tubes, and rated as 8-horse power. The working pressure is 80 lbs. per square inch. The boilers are fed by a small horizontal duplex pump. The main steam-pipe is 2 inches diameter, with 1½-inch branches to each pump. The pumps have 8-inch diameter steam-cylinders and 6-inch diameter pumps, with 10-inch stroke. The duty of each pump is to deliver 6000 gallons per hour through a 5-inch rising main, 1200 yards long, to a height of 110 feet. When delivering into the service reservoir, the pressure shown on a gauge taken from the rising-main is about 60 lbs., and when at rest 45 lbs. per square inch.

The collecting reservoir is built in front of the pumping-station. The inside measurements are 32 ft. by 16 ft.; the depth of water when full being 10 feet. The walls are built in brickwork 3 ft. 4½ in. thick at the bottom and 1 ft. 10½ in. at the top. The walls rest on concrete foundations 2 feet thick; the floor also being of concrete 1 foot thick, and the whole of the inside surface rendered with 1 inch of cement. The roof is formed in three arches of 12-inch concrete, resting on wrought-iron girders supported in their centres by 6-inch cast-iron columns. Two ¾-inch wrought-iron tie-rods are fixed longitudinally across the reservoir. The suction-pipes (4 inches in diameter) are placed in a sump, and fitted with strainers and foot-valves. The height from the bottom of the sump-hole to the engine-room floor is 21 ft. 2 in.

The water is conveyed to the reservoir from the springs by 6-inch glazed earthenware socket pipes, joined in cement. Four springs are at present connected to the collecting-reservoir; their total flow being 100,000 gallons per day. After leaving the pumping-station, the 5-inch delivery-main rises for the whole distance of 1200 yards to the service or distributing reservoir. The reservoir is constructed entirely of cement concrete, partly below and partly above the ground level. The internal dimensions are 41 ft. by 21 ft. by 12 ft., giving a capacity of about 65,000 gallons. The walls are built vertically at the back; and the interior sloped to a batter of 1 to 6. The base is 4 feet, and the top 2 feet thick. The floor is 1 ft. 3 in. thick; and the walls and floor are rendered with cement 1 inch thick. The roof is built with four concrete arches 12 inches thick, supported by rolled-iron girders and cast-iron columns in the centres. Cast-iron ventilators are fixed in the arches; and the roof is covered with about 18 inches of top soil, sloped off at the sides to the ground surface.

The actual cost of the works amounted to £13,722. Looking at the scheme as a whole, and considering the small rateable value and the sparsity of population, together with the large mileage of mains, the author thinks the scheme is somewhat unique, and should encourage other localities similarly situated to "go and do likewise." Since the works have been completed, numerous houses have been built in the district; whereas for many years previously no houses had been erected, and the population was dwindling.

Cost of the Scheme.

Mains	£5,300
Sluice-valves, &c.	260
Reservoirs	1,100
Laying mains	4,120
Engines and pumps	430
Engine-house	542
Land, &c.	750
Legal and engineering expenses (including £150 costs of the Public Works Loan Commissioners)	399
Collecting drains	160
Contingencies (including clerk of works and tools)	670
Total	£13,722

The lowest tender received from a Contractor for laying the mains was £5386, whereas the work was actually carried out by the author at a cost of £4372—a saving of more than £1000.

Cost of Pumping (including Coal, Wages, and Incidental Expenses).

Total cost for 105 days' pumping	£77 18s. 9d.
Hours pumped	634½
Cost of pumping 1000 gallons	5·6d.
Cost of day's pumping	14s. 10d.
Cost of hour's pumping	2s. 5¾d.
Water pumped per cwt of coal (including lighting fires)	3996 gallons
Ditto, ditto (not including lighting fires)	4570 ,,
Cost of coal delivered at pumping-station, per ton	£1 1s. 0d.

The charges for water are as follows: Cottages under £6 rateable value, 2d. per week, or 8s. 8d. per year; over £6 rateable, 2s. in the pound. Water is charged for by meter when used for other than domestic purposes: Minimum charge, £2 per annum, or 1s. 3d. per 1000 gallons, not exceeding 80,000 gallons a year; above that quantity, 1s. per 1000 gallons.

Swan-neck standposts are erected in various localities to enable the farmers to fetch water in butts for use on the farms not adjoining the mains, for which a charge of £3 per annum is made.

Chelmsford Rural District Council Water-Works.

The various works of water supply owned by the Rural District Council of Chelmsford are: A. "Great Baddow," supplying Springfield and Great Baddow, two adjoining parishes, having a population of 5582. The supply is derived from springs in the

gravel, yielding from 70,000 to 90,000 gallons per day, which, being insufficient, has been supplemented by a new bore hole, 10 inches diameter and 410 feet deep, from which a further supply of 74,000 gallons per day has been obtained during a continuous trial of fourteen days and nights (completed May 22 last). B. "Ingatestone," supplying the parish of Ingatestone, having a population of 1748. A supply, derived from springs in the gravel, of 14,000 gallons per day is being abandoned owing to pollution, and a trial boring, 800 feet deep and 10 in. diameter, has been completed, yielding (on a trial of fourteen days and nights) 40,000 gallons per day, which is considered a sufficient supply. Plans for these works, including a well 350 feet deep, duplicate engines and pumping plant, engine and pump house, a covered service reservoir, and a water-tower, are now being prepared by Mr. Dewhirst; but to meet present requirements, one of the engines (a Cundall oil-engine of 20 brake horse power) has been put down in a temporary position, and an 8-inch borehole pump, drawing from a depth of 330 feet, has been inserted in the boring, being so arranged that the well-sinking may be carried on without interfering with the supply to the district. C. The "Danbury scheme" for the supply of seven parishes, further details of which will be given. D. The "Walthams scheme," supplying Great and Little Waltham (population 1200), from springs in the gravel; Little Waltham being supplied wholly by gravitation, and Great Waltham by means of a hydraulic ram. E. The Council are also about to provide a supply of water for Writtle, a village with a population of 2700, and are making a trial boring 12 inches in diameter under the advice of Messrs. Taylor and Santo-Crimp.

For the purpose of this paper, the Danbury scheme is described as an example of works covering a large area with small population and low rateable value. These works were commenced on a small scale in 1891, and have since been gradually extended. Prior to April, 1899, the works were designed and carried out by the late Mr. J. C. Smith, then Engineer to the Council, since which date the works have been in the hands of Mr. Dewhirst.

The following table gives a list of the parishes included in this scheme, with other particulars:—

Parish.	Area in Acres.	Population, 1901.	Houses Supplied.	Assessable Value.
Little Baddow	2,779	510	55	£2,327
Danbury	3,455	849	116	3,537
East Hanningfield	2,590	418	81	1,735
Rettendon	3,340	692	150	3,117
Runwell	2,077	239	52	1,395
Sandon	2,297	398	25	2,215
Woodham Ferris	4,354	877	199	4,086
Totals	20,892	3,983	668	£18,412

The works were first commenced in 1891, when it was decided to provide a public supply for Danbury village from a spring of water vested in the Council, breaking out on Danbury Common 220 feet above Ordnance datum, and known as Buells Well; the yield at that time being 70,000 gallons per day. This spring is nearly ¾ mile from the highest part of the village, and the water was raised to a cast-iron tank of 3000 gallons capacity, placed on a brick tower 20 feet high, involving a lift of 170 feet. For this purpose a hydraulic ram was put down, having a rising main, 2 inches in diameter. The service mains (about 3 miles in length) were mostly of 3 inches diameter and of cast iron, a short length only of 2 inches diameter being used. The total cost was £868, for which a loan was obtained, to be repaid in 30 years, the rate of interest being 3½ per cent.

The Council then decided to utilize the waste water from the hydraulic ram, and to supply by gravitation parts of the parishes of East Hanningfield, Rettendon, Runwell, Woodham Ferris, and an additional portion of Danbury. A reservoir of 40,000 gallons capacity, with brickwork walls and concrete bottom, covered with a span roof of timber, was constructed, into which the water delivered by the ram was conveyed. From this reservoir a 4-inch diameter cast-iron main a little more than a mile in length was laid to Bicknacre, a 2-inch diameter main 1¼ miles in length being taken off on the way to supply dwellings on the road to Slough House. From Bicknacre two 3-inch diameter mains were taken off—one, 2¼ miles in length, going to Woodham Ferris, and the other, 4¾ miles in length, going through East Hanningfield to Rettendon and an outlying portion of Runwell, and a 2-inch diameter main ½ mile in length at Coal Hill, Runwell.

For this work a loan of £3230 was sanctioned; the period for repayment being 30 years, and the rate of interest 3½ per cent. This amount was apportioned among the parishes as follows: Danbury, £230; East Hanningfield, £607; Rettendon, £785; Runwell, £190; and Woodham Ferris, £1418. Up to this point the works appear to have been satisfactory, and the Council determined to make further extensions in Woodham Ferris, Rettendon, Runwell, and certain portions of Sandon and Little Baddow.

Sanction was obtained to borrow this sum, to be repaid in 30 years; the rate of interest being 3¼ per cent. This amount was charged to the various parishes as follows: Little Baddow, £575; Danbury, £135; East Hanningfield, £134; Rettendon, £2240; Runwell, £659; Sandon, £540; and Woodham Ferris, £1156.

The parish of Little Baddow, being on the north side of Danbury Hill, was supplied by extending the mains from Danbury; both parishes being supplied from the tower tank. The hydraulic ram being insufficient for this additional duty, "Campbell" engines and pumps in duplicate were placed in an engine-house adjacent to the Danbury reservoir—each set being capable of raising 4000 gallons of water per hour to the tank on Danbury Hill. A 4-inch rising main was laid in place of the 2-inch one used for the ram.

The gravitating main was then coupled direct to Buells Well Spring, thus giving an increased head of 20 feet, which was much required at East Hanningfield. The overflow from the well was taken into Danbury reservoir, with a bye-pass to insure a proper supply to the reservoir in case of failure of the overflow. The Danbury reservoir was thus converted into a suction reservoir, from which the water is pumped to supply Danbury and Little Baddow. A reservoir of 75,000 gallons capacity was constructed on land purchased for this purpose on Rettendon Hill. This is of brickwork laid in cement, having a concrete bottom and the whole floated inside with cement mortar, and is covered with a span roof of close-boarded timber and corrugated iron.

The main to the low portions of the district was branched off from the Woodham Ferris main, which was then continued to meet the main from Hanningfield, and one main only was carried to Rettendon reservoir, fitted with a reflux valve, a branch going above the top water-level, where it was fitted with a ball-valve, the idea appearing to have been that during the night, when the consumption was small, the water would accumulate and be drawn upon during the following day. This arrangement was, however, in no way satisfactory, and gave considerable trouble.

The Engineer's estimate for carrying out these works was as follows:—

7700 yards of	3-in.	main,	Rettendon Bell to new reservoir	£718 16 0
2200 ,,	4-in.	,,	reservoir to Runwell Hall	323 19 0
4840 ,,	3-in.	,,	Woodham Bell to railway station	451 11 6
2000 ,,	3-in.	,,	railway station to Woodham Fen	186 10 0
2200 ,,	4-in.	,,	Runwell Hall to railway station	323 19 0
2797 ,,	3-in.	,,	Danbury to Little Baddow	260 19 6
4200 ,,	3-in.	,,	South Gibcrack to Sandon	351 5 0
Hydrants and casings				37 0 0
Sluice valves and casings				90 13 0
Site of reservoir				100 0 0
Reservoir				380 0 0
Bye-pass				23 0 0
Two oil-engines and pumps				410 0 0
Four-inch diameter rising main				150 0 0
Wages				1,227 17 0
Making good damage to roads				255 0 0
Compensation				10 0 0
Legal and other expenses				139 0 0
Total				£5,439 10 0

The whole of the work was certified as complete during 1898; but, unfortunately, the yield of Buells Well soon decreased in volume from 70,000 to 24,000 gallons per day owing to the continued drought, with the result that no water could be obtained at any of the higher parts of the gravitating system. The Council thereupon called in Messrs. J. Taylor, Sons, and Santo Crimp to advise them. After an inspection of the works, they reported, pointing out several grave errors in design, more especially in the size of the mains used, and advised that a spring in the adjoining valley at Danbury, known as Thomas's Spring, with a yield of 18,000 gallons per day, should be purchased, and a culvert constructed across Danbury Common. From this culvert it is expected that 16,000 gallons of water per day will be obtained; making a total, with other sources, of 58,000 gallons per day, which, as a minimum supply, is considered to be sufficient for the requirements of the district.

On Mr. Dewhirst's appointment as Engineer in April, 1899, the Council decided to purchase Thomas's Spring, construct an additional reservoir, and put down further pumping plant.

The plans of the proposed new works having been prepared, application was made for sanction to borrow £4240, made up as follows: Estimated cost of works, £2490; purchase of 22 acres of land, £1000; and amount overspent on 1897 loan, £750. The works included the construction of a covered reservoir of concrete, additions to engine-house to receive a 7 brake horse power "Campbell" oil-engine and three-throw pump, a collecting tank at Thomas's Spring, a collecting culvert across Danbury Common, and the laying of 1572 yards of 5-inch diameter and 1467 yards of 3-inch diameter cast-iron mains. As the difference in level between the collecting-tank at Thomas's Spring and the Danbury reservoir is only 1·75 feet, and the distance between the two points measured along the contour of the hill is 792 yards, the pipe is taken into Danbury reservoir through the wall near the bottom and delivered through a floating arm discharging a few inches above the water-level. By this means, the head from Thomas's Spring is increased as the water-level in the reservoir falls. In order to meet the requirements of the Local Government Board, the design of the service reservoir roof was altered, and arches in concrete substituted for steel girders carrying the concrete as originally intended.

The sanction of the Local Government Board was ultimately obtained to a loan of £750 to pay off the overspent loan of 1897, and £1710 for the purchase of Thomas's Spring and land, and the necessary works to convey the water to the Danbury reservoir. The Board refused to sanction the remainder of the scheme until the consents of the Board of Agriculture, the Lord of the Manor, and other persons having "common rights" had been obtained for the construction of a reservoir on the common. This, however, proved so difficult a matter, that the Council are

now negotiating for the purchase of freehold land adjoining the common on which to place the reservoir.

The loan of £750 is to be repaid in 30 years, and the loan of £1710 in 52 years. Both amounts have been borrowed at $3\frac{3}{8}$ per cent. interest. Up to the present, the works have therefore cost a sum of £11,997, raised on loan, in addition to extensions of service mains in various directions, which have involved a further sum of £350, met by a special rate levied on the particular parish where the extensions have been made, assisted in some cases by a special contribution from owners of property benefited thereby. The total length of mains laid in connection with the scheme is 27 miles; and applications are being constantly made for further extensions. The working expenses of the system amount to about £250 per annum.

The water-rates charged are as follows: For domestic purposes—Cottages, 8s. 8d. per annum throughout the district. Dwelling-houses above £10 rateable value: Danbury, 2s. in the pound; all other parishes, 2s. 6d. in the pound. For trade purposes, 1s. 6d. per 1000 gallons, *plus* rent of meter. For building purposes, 3s. per 1000 gallons, meter free. Where a supply is used for both trade and domestic purposes, and where it is not advisable to give two services, a meter is fixed, and the supply is given as for trade purposes, with a minimum charge per annum equal to the amount that would be charged for a domestic supply to the premises, *plus* rent of meter. The rents of meters, including maintenance by the Council, are as follows: ½-inch, 12s. per annum; ¾-inch, 15s. per annum; 1-inch, 20s. per annum. The annual revenue derived from water-rates is about £565. The amount required to pay off the principal and interest on the loans is £590 per annum; and adding the working expenses to this brings the amount required annually to £840—leaving a balance of £275 to be raised by a special rate.

When the 1893 scheme was carried out, various calculations were made as to the best basis for the apportionment of the loans among the various parishes. They were: A. On rateable value. B. On population. C. On houses to be supplied. D. On the length of mains laid in each parish.

It was decided to adopt basis D; and the Local Government Board duly approved, and, moreover, have insisted on this basis being taken in the subsequent loans, except that the engines and pumps have been charged exclusively to the parishes of Danbury, Little Baddow, and East Hanningfield; these being assumed to be the parishes benefited thereby. On this basis, too, the working expenses were also apportioned until two years ago, when, as this appeared to be unsatisfactory, it was decided to adopt basis C, which has proved to be more satisfactory.

After careful investigation, the authors have come to the conclusion that the only fair method of apportionment is that based upon the assessable value for special purposes—*i.e.*, full value on houses and buildings, and one-fourth upon land, tithes, &c. Owing to the peculiar nature of any scheme of rural water supply, there must be many places that cannot derive any benefit whatever from the supply, and they must perforce pay their share of the deficit, which is raised by the special sanitary rate.

It is often argued that the water-rates should be sufficiently high to repay, not only the interest and repayment of loan, but also the working expenses; but the authors are strongly of opinion that it would be impossible to adopt this course in schemes similar to those described in this paper, owing to the fact that cottages under £10 rental cannot be charged more than 3d. per week (and that only in exceptional circumstances); and therefore the amount charged to houses above that rental and for trade purposes would be practically prohibitive. As an instance of this, the Purleigh scheme may be cited. The annual amount to be raised for the year ending September, 1901, was £1160. Of this, 245 cottages at 3d. per week would raise only £160; and the balance of £1000 would therefore have to be raised by the remaining 126 consumers, involving an average contribution of £8 per annum from each consumer. It should be borne in mind that to apply this principle consistently, would mean that rates for sewerage schemes should only be paid by those whose houses are connected with the system, which would be obviously absurd.

Discussion.

Mr. H. G. Keywood, in introducing the discussion, referred to the question of the redemption of loans. Speaking as an officer of a rural district where money was scarce, he said it was a source of trouble to have to commence the redemption of loans almost before they began to use the money—anyway before they were getting a return from it. Then another point that required looking into was the unfairness of the incidence of the rating. People who did not receive any benefit from the supply had to pay their quota of the expense; and he suggested that some little latitude should be allowed, so that rural districts might be able, on the completion of the redemption of the loan, to make a little profit on the works, so as to repay those people who had not benefited from the loan in any shape or form.

Mr. Dewhirst also contributed a few remarks. He said that the two systems described in the paper were almost adjoined; and it would perhaps have been better if the two authorities had united for the supply of the two districts. In Essex, they had the least rainfall in the whole country; and, to his mind, in the future, instead of relying upon the surface springs as these two schemes did, they would have more and more to go in for deep well supplies. In one part of his district he had had to take a boring down 800 feet before obtaining an abundant supply for the area; and they were about to spend £10,000 on the works there. In another part of the district, they had obtained an abundant supply at 410 feet. He believed the time was not far distant when they would have to couple up these supplies; and this led him to say that he was of opinion that the formation of Water Boards was a very proper thing. The question of the waste of water in large rural districts was an important one. In his district they kept an inspector going, and found it paid them.

Mr. H. Preston (Grantham) thought it was necessary they should have not only the prime cost of the supply, but also the working expense. Looking at the cost of pumping, it seemed to be particularly high. Taking the fuel, for instance, for the steam-engine, it worked out to something over 3d. per 1000 gallons pumped. He had himself been putting down a small plant to pump 25,000 gallons of water per hour with an oil-engine; and the cost of fuel required by the oil-engine worked out to a little below 1·35d.

Mr. W. Whitaker (Croydon) agreed with the authors that they could not find a worse place than Rural Essex for water supply; and he was also at one with Mr. Dewhirst as to the advantage of coupling up supplies. The more they could get local authorities to confederate or club together in this matter of water supply, the better would be the results. Two or three small works could be easily joined, and so made to help one another. This not only applied to small works, but to large ones. He should like to have the analysis of the water from these deep wells, as it was universally thought that water obtained from the chalk below London clay did not give the analysis of an open chalk water.

Mr. C. H. Priestley (Cardiff), referring to the question of loans, said Parliament had in the case of large towns allowed the loans for a certain number of years to be charged to capital, which was the same thing practically as deferring payment; and he did not see why they should not do the same thing in small places like those described in the paper. Mr. Keywood had also said there were certain people in parishes who received no benefit whatever from the works carried out. He did not altogether agree with this, because whether or not people in a parish took the water, they received some benefit from the better health of the place generally. As to the payment of water-rental, in Cardiff they charged in the rural districts very similarly to the authors. They had rather a large number of outside districts apart from the borough. Where a farmer took a supply of water for farming purposes, they charged a minimum rental (in the same way that the authors did) for household purposes, and 1s. per 1000 gallons above the minimum rental for farming use. This was far and away the best plan; and there was no grumbling. He was pleased to see the authors had no extra charges, as he thought it a wise policy not to charge people for keeping themselves clean. They ought, for the general health of the community, to encourage the use of baths; and, if it was necessary to make up the revenue, it should not be done by putting a premium on cleanliness. As to the question of the combination of districts for water-supply purposes, he believed that nearly all engineers were in favour of amalgamation. There was no doubt that different districts could, by combining, obtain water more cheaply than by each going in for a supply on its own account.

Mr. J. S. Pickering (Nuneaton) noticed that the total outlay on one of the schemes was equal to two years' assessable value. This was the maximum amount allowed by the Public Health Act; but he observed that the estimate was somewhat exceeded. He should therefore like to know how the money was found for this extra expenditure. He thoroughly agreed with the last speaker regarding the charge for baths and water-closets. He thought it was a mistake, because, as a rule, it was only the better-class houses that had baths, and they were already rated higher than the ordinary houses on account of the higher rental. They really paid extra for the disadvantage of living in a larger house. As to deferring repayment of loans during the construction of works, it had been put to the Local Government Board time after time; and he believed they had made it a rule not to allow the time for repayment to be deferred. He thought it was hard, and that some representation should be made to induce them to relax the rule in this respect.

Mr. W. Watts (Sheffield) was of opinion that those people who enjoyed good bath and extra water-closet accommodation should pay for it. If not, he did not see how the rates were going to be blended so that they were equal throughout a supply district.

Mr. C. Gilby (Bath) was strongly of opinion that the better-class houses paid far in excess for their additional consumption. He had never yet found that the use of water in houses of the better class amounted to anything like the difference between the water-rent of the smaller houses and that of the larger houses. He could not therefore see any reason in the occupiers of the latter being called upon to pay extra for baths and additional water-closets. There was no doubt that at the present time, under the ordinary conditions of supply, the rich did pay for the poor to a great extent.

Mr. C. E. Jones (Leyton) said he noticed the Association were asked to make some representation to the Local Government Board respecting loans. His opinion was that the Association should do nothing of the kind. The indebtedness of local authorities was already of stupendous proportions, and causing

considerable anxiety. If the Local Government Board granted longer loans, the greater would be the inducement for money to be borrowed and spent—wisely or otherwise.

Mr. J. LEES (Tonbridge) said, with reference to the remarks that had been made about poor houses paying so little in proportion to the larger houses, he was afraid that for a water company there would be very little dividend if they had not the larger houses to depend upon. It was all very well for a municipal or district council talking about not charging for extra water service, because they could make up any deficiency out of the rates. His experience was that where a working man paid 2s. 2d. a quarter, or 2d. per week, for water, he used quite four pennyworth of water in a week; and if they had not the larger houses to depend upon, he did not know where the companies would look for their dividends. A family living in a house where they could have a bath any number of times a day ought not to grudge an extra 2s. 6d. a quarter for it.

Mr. T. MOLYNEUX objected to what had been said on the subject of the rich and poor. The Act of 1847 laid down the rule that the rich man should pay for the poor man's water; and he thought that it was a blessing it was so.

Mr. KEYWOOD, in reply, said he knew the cost given in the paper for pumping was extremely high. This was due to two or three reasons—for example, the small and variable quantity of water pumped, and the fact that the total cost of the men's wages was taken into account. The quantity of water pumped one time might be 60,000 gallons, another day it might be 15,000 gallons, and another day there might be no pumping at all. At the present time, the cost of pumping was not more than 3·2d. per 1000 gallons. With reference to the hint he threw out, asking for the help of the Association in connection with the repayment of loans, it was, he thought, entirely misunderstood by Mr. Jones. He was not asking for facilities to borrow more than was laid down by the Act, but that the repayment should be made a trifle easier. Regarding the borrowing of money in excess of their powers, it was done this way: An estimate was made of the amount for which the work could be carried out. They then applied to the Local Government Board, who said they could not borrow so much money. The estimate was thereupon cut down; and when they had repaid part of the money, they applied to borrow an additional £800. The Board told them that as soon as they had paid back part of the money, they would sanction the borrowing of the additional amount.

Mr. DEWHIRST, in his reply, praised the work Dr. Thresh has done in the matter of the water supply of Essex, and also gave information on a number of points not noticed in this abstract report of the discussion.

Colchester Street Lighting a Hundred Years Ago.—The following extract is taken from the "Essex County Chronicle" of a century ago: "A general meeting of the Commissioners for lighting the Town of Colchester will be held at the Moothall on Thursday, the 12th day of August next, to receive proposals for lighting the said town for the term of six years; to light 250 lamps with common burners, or 160 lamps with Smethurst's patent burners, for 170 nights, from the 15th of September to the 15th of August in every year, and the lamps to burn upon an average ten hours and a half each night.—W. Mason, Town Clerk, Colchester."

Morpeth Gas Company to be Wound-Up and Reconstructed.—At the close of the proceedings at the recent annual meeting of the Morpeth Gas Company, an extraordinary meeting of the shareholders was held, when a resolution was unanimously passed for the winding-up of the Company, with a view to its reconstruction, under the same name, but on more modern lines, "in order to meet the increasing requirements of the town for gas as a means of light and heat." It was announced that, as soon as the new Company was formed, the reserve fund would be distributed in the form of a bonus, among the existing shareholders, and that it would amount to about 9 per cent. on the ordinary capital of the Company.

Cefn Mawr in Darkness.—A dispute has arisen between the Cefn Mawr Parish Council and the Gas Company with reference to the price of gas. At a recent meeting of the Council, a letter was received from the Company to the effect that they would not reduce the price for this season. Thereupon the Council unanimously passed a resolution to the effect that the lighting of the town, with its 10,000 inhabitants, should be delayed until a reduction had been made. The Clerk was instructed to wait upon the Directors with the view of getting a reduction if possible, the present price being 4s. per 1000 cubic feet. A resolution was also unanimously adopted to take into consideration the lighting of the public streets, &c., by electricity, in the event of the reply from the Company being unsatisfactory.

New Water-Gas Plant for the Cologne Gas-Works.—The Cologne Corporation have ordered two sets of water-gas plant on the Strache system, each of a productive capacity of 35,000 cubic feet per hour. These two sets will therefore be capable of producing nearly 1,700,000 cubic feet of gas per diem; and it is intended ultimately to extend the plant to double this capacity. The two sets now on order are to be adapted either to use petroleum or shale oils, or to vaporize benzol; so that whichever carburetting agent is the cheaper for the time being may be employed for carburetting the water gas. They are being erected by the Cologne Engineering Construction Company of Cologne-Bayenthal, and are to be ready for use during the ensuing winter. It is reported that the Strache water-gas plant at Charkow in Russia has made gas of an illuminating power of 13 candles (probably 13 "Hefner-units" equal to 11·4 English standard candles) at an expenditure of 132 oz. (about 1 gallon) of crude petroleum naphtha per 1000 feet.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—KING'S BENCH DIVISION.

Monday, Aug. 11.

(*Before Mr. Justice* LAWRANCE.)

Ilford Gas Company v. Ilford Urban District Council and Jackson (Third Party).

Judgment was given this morning in the above case, which was heard with regard to the third party proceedings on the 26th ult. (*ante*, p. 286).

Justice LAWRANCE said the action was brought by the Ilford Gas Company against Urban District Council and their Contractor, Mr. Jackson, for damage done to their gas-mains in Green Lane, Ilford, by the defendants, through their Contractor, when he was constructing certain sewers. The case was tried some weeks ago;* and the Jury returned a verdict for the plaintiffs, with £200 damages against the Council. The Council then came upon their Contractor, whom they had brought in as a third party, and sought to make him liable upon their contract with him; contending that if there had been any negligence, he was the only person responsible. The contract which was made on Feb. 26, 1901, between Mr. Jackson and the Council, provided among other things that he should save the Council harmless, and "indemnify them from all claims and actions for and in respect of any damage or injury to persons, whether properly arising therefrom or occasioned by the neglect, mistake, or default of the Contractor or any person employed by him, or otherwise howsoever, from or by the execution of the works." Those words seemed to him to be intended to have as broad a meaning as it was possible to give them; and he did not know that stronger language could have been used. The facts were that the trenches in which the plaintiffs' pipes were laid were apparently not filled up properly by the Contractor's men; the result being that heavy traffic caused the pipes to crack, and let the gas escape. Whether or not there had been negligence on the part of the Contractor, it was unnecessary to say; and the only question was whether, under the contract, Mr. Jackson was liable for the damage done. In his judgment, the Contractor was liable; and he saw no escape from the words he had read. This being so, there must be judgment for the District Council against Mr. Jackson, with costs.

Mr. C. A. RUSSELL, K.C., asked for judgment for the £200 they had had to pay the Gas Company, with costs, and, in addition, he submitted that, under the indemnity, they were entitled to their own costs in that action as between solicitor and client.

Mr. MACKENZIE (for the Contractor) opposed the application.

Justice LAWRANCE said the words of the contract were wide enough to make it a complete indemnification.

His Lordship gave judgment against the Contractor, with all the costs of the proceedings, but granted a stay of execution in view of an appeal; it being arranged that £1300 retention-money which the Council had in hand should be held by them pending the appeal.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Tuesday, Aug. 12.

(*Before Mr. Justice* FARWELL.)

Bradford Corporation and Others v. Ferrand and Others—Rights in Underground Water.

A reserved judgment in the above-named case was delivered to-day, under the following circumstances: The Bradford Corporation and certain other plaintiffs (including the Leeds and Liverpool Canal Company), applied for an injunction to restrain the defendant Ferrand and the Shipley Urban District Council from interfering with, diverting, or obstructing the flow of water to the Sweet Well Spring. The Corporation are owners of the Sunnydale mill and reservoir, at the head of the Morton Valley, and close to two becks, which, after uniting, form a stream called the Morton Beck, which flows into the River Aire. The Canal Company are entitled, by statute and agreement, to divert a considerable quantity of the water in Morton Beck. The remaining plaintiffs are owners or occupiers of mills situate on Morton Beck between the Corporation mill and the place where the canal crosses the beck. The defendant Ferrand is owner and occupier of a part of Morton Moor, upon which part a spring—known as Sweet Well Spring—rises and flows by means of a natural stream (the Sweet Well Dyke) into the Sunnydale reservoir. The plaintiffs alleged that, before coming to the surface, the water that issued at Sweet Well Spring flowed in a "well defined and ascertained channel under the surface of the ground," and that from time immemorial the spring had been, and up to the beginning of 1901 was, one of the main feeders of Morton Beck, and had been in dry seasons the principal feeder. The plaintiffs further alleged that the defendant Ferrand had granted permission to the Shipley District Council to sink certain shafts or wells on his land in close proximity to the spot where the waters of Sweet Well Spring flowed to the surface, and that early in 1901 the Council sank shafts or wells for the purpose of diverting, as they did in fact divert, the waters in "their well-defined underground channel," and they prevented the waters from flowing to the surface in their accustomed channel, and that thereby the plaintiffs had suffered loss and damage. The plaintiffs claimed, *inter alia*, (1) a declaration that each of them was entitled to the uninterrupted flow of water from Sweet Well Spring to the Sunnydale reservoir and

* See "JOURNAL," Vol. LXXIX., p. 1581

thence to Morton Beck, as it had hitherto been enjoyed; and (2) an injunction restraining the defendants from intercepting, diverting, or obstructing the water flowing in a defined channel or defined channels to and feeding Sweet Well Spring, so as to diminish the quantity of water flowing from the spring to Sunnydale reservoir, and directing them to remove all their shafts, drains, and works whereby such flow might be wholly or partially diverted or obstructed. The defendants denied that the water which issued at Sweet Well Spring, before issuing to the surface, flowed in a well-defined or in an ascertained channel under the surface of the ground, or in any defined or ascertained channel; and they further pleaded that if the water, before issuing to the surface, did flow in a well-defined channel under the surface of the ground, the channel was not an ascertained or known channel. In April last the plaintiffs moved for leave to enter upon the land of the defendants and make the necessary excavations, experiments, and observations for the purpose of ascertaining whether or not the waters which previously issued at Sweet Well Spring, before so issuing, flowed in a definite underground channel. The learned Judge, without expressing any opinion upon the law, refused the motion, on the ground that the plaintiffs' evidence was insufficient to found the application, as they had not even given *primâ facie* evidence that there was a known channel. The plaintiffs appealed; and on the appeal, it was agreed that the defence should be amended by raising a direct issue between the parties upon the point of law, and that an application should be made to Mr. Justice Farwell to decide the point before the trial. The defendants accordingly amended their defence and raised the point of law as follows: "Assuming that underground water flows or flowed to the Sweet Well Spring in a defined channel, but that the existence and course of that defined channel is not and cannot be ascertained or known except by excavation of the soil, the plaintiffs have no right of action for the abstraction of such underground water, and are not entitled to maintain this action." The point of law was argued on the 6th inst.

His Lordship decided against the plaintiffs by a declaration that there is no right in underground water where the course of its channel is unknown; and the plaintiffs were ordered to pay the costs of the application. In the course of his judgment he said that the rights in relation to water flowing in a defined and known channel or under the surface of the earth were now well settled. Every riparian proprietor had an equal right to the ordinary use of the water which flowed in the stream adjacent to his lands as it had been wont to run—a right incident to the property in the land through which it passed; and one that did not depend on a supposed grant, but was *jure naturæ*. But the right did not extend to water percolating through the strata in no known channels, or to common surface water rising out of springy or boggy ground and not flowing in any definite channel. No English authority had, he said, yet dealt with the rights to water flowing underground in a defined but unknown channel; and, although there was the express authority of the Court of Appeal in Ireland, he felt bound to form his own opinion on the point. After the manner in which the case of *Chasemore v. Richards* was argued and decided in the House of Lords, he could not treat the right to the flow of the stream as founded on a rule of positive law the origin of which was lost by the progress of time; but he felt bound to try to find the principle on which the right rested. The foundation of the right as stated throughout all the cases was *jus naturæ*. But what was the meaning of *jus naturæ?* It could not mean merely that the water was a natural incident or accessory to the land; for this would not be a sufficient foundation for the right claimed. The percolating waters in *Chasemore v. Richards* and the surface water in *Rawstron v. Taylor* were equally the gift of Nature; and the former would by natural causes flow, to some extent at any rate, into the same stream. It was plain that the mere statement that water, light, or air was a gift of Nature did not necessarily involve the general conclusion that there could be no interference with their enjoyment. He had come to the conclusion, therefore, that *jus naturæ* was used in these cases as expressing that principle in English law which was akin to, if not derived from, *jus naturale* of Roman law. He was not introducing any novel principle when regarding *jus naturæ*, on which the right to running water rested, as meaning that which was *æquum et bonum* between the upper and lower proprietors. This appeared to him to be the view expressed by Mr. Justice Dodderidge in *Shury v. Piggot* when he gave a second reason, "drawn from the nature of water, the which will naturally descend and will make a way for its passage if stopped." He was evidently considering the relative positions of the upper and lower owners—each had his rights *jure naturæ*. If the upper owner dammed the stream, the lower lost the passage of the water; if the lower owner dammed the stream, he flooded the higher owner's lands. What, then, he asked, was fair and reasonable between the parties? It was obvious to all that the water in the known and definite channel ran down towards the lower ground. It was, therefore, *æquum et bonum* that neither owner should interfere with it, and thereby each would avoid injuring the other and escape injury himself. This, too, was the only explanation of the continued reference to knowledge of the existence of the stream which occurred in the cases. In *Acton v. Blundell*, Chief Justice Tindal referred the origin of the law of running streams to the fact that the right enjoyed by the several proprietors of the lands over which they flow was and always had been "public and notorious." In *Chasemore v. Richards*, Lord Cranworth said that there was no difficulty in enforcing the right, because running water was something visible, and no one could interrupt it without knowing whether he did or did not do injury to those who were above or below him. But he (the learned Judge) was unable to see how ignorance or knowledge on the part of a defendant could affect the right of the plaintiff in a civil action to enforce his legal right, except on the footing that the existence of such right depended on the consideration of what was *æquum et bonum* between the parties. In the present case there was a spring issuing from the defendant's land—fed *ex hypothesi* by a subterranean stream flowing in a defined channel from the higher ground. This ground might extend to a large number of acres, and might belong to many different owners. No one could tell where or in whose land this hypothetical stream ran. If the plaintiffs were right, no proprietor of land above the spring could sink a well or make excavations on his own ground without the risk of incurring liability (possibly to a very large amount) to the plaintiffs for interfering with the spring; and this was a much larger liability than that unsuccessfully sought to be established in *Chasemore v. Richards*, for a defined stream might flow for miles, whereas the gathering-ground of water penetrating by percolation was of comparatively small extent. He would apply Lord Chelmsford's question in *Chasemore v. Richards*: "Are the most distant landowners, as well as the adjacent ones, to be bound, at their peril, to take care to use their lands so as not to interrupt the oozing of the water through the soil to a greater extent than shall be necessary for their own actual wants?" and Lord Wensleydale's observation in the same case: "In the second place, as the great interests of society require that the cultivation of every man's land should be encouraged, and its natural advantages made fully available, the owner must be permitted to dig in his own soil, and in so doing he can very rarely avoid interfering with the subterraneous waters flowing or percolating in his neighbour's land." In the case of *Ewart v. Belfast Poor Law Guardians*, one learned Judge said: "If the view which has been contended for by the plaintiff in this case is correct, we would have the startling doctrine that an action at law would lie against a man, without any limit to the damages that could be recovered, for doing an act which, as far as he knows, or as far as can be known by reasonable inquiry, is a lawful act, and the unlawfulness of which would depend upon the fact that, by some newly discovered method of examination being resorted to, it was ascertained that the water flowed in a defined channel—a fact which but for that method being resorted to would have remained for all ages unknown. That would be a monstrous doctrine." Another of the Judges in the same case said: "In my opinion, it is quite impossible to recognize a natural right which would subject the lands of another to the burden of maintaining an unknown flow of water (whatever be the geological character of its channel) without introducing every difficulty which has already prevailed to prevent the recognition of such a right in respect of 'percolating' water, strictly so called. It appears to me impossible to find the test of the existence of either natural rights or acquired easements in *ex post facto* geological investigations. Yet it is by some such means alone that any difference could be discovered between oozing or percolating water and water running through or collecting in underground fissures." Regarding the present case as one to be decided on the general consideration of *æquum et bonum*, it was not immaterial to remember that three eminent Judges of Appeal in Ireland had decided that the lower owner had no right to prevent the obstruction of a subterranean stream flowing in a defined but unknown course, and such view accorded with American decisions. "The defined watercourses" referred to in *Wheatley v. Baugh*, which a man "may not divert to the hurt of an inferior proprietor, are not the hidden streams of which the owner of the soil through which they pass can have no knowledge until they have been discovered by excavations made in the exercise of his rights of property." He was thus confirmed in his view of what was *æquum et bonum* by finding that he shared it with many eminent persons, although their opinions were not authorities behind which he could take shelter. There would be no declaration, therefore, as asked for by the plantiffs.

Mr. Austin Cartmell (for the plaintiffs) said it was possible that the judgment might make an end of the action.

Mr. Butcher, K.C., who appeared for the defendants, confessed that his impression was that this would dispose of the action.

His Lordship considered it eminently a case that should be considered by the Court of Appeal, and if Mr. Cartmell wanted leave to appeal he could certainly have it; but he did not think leave was necessary.

Flooded Electricity Supply Mains.

Last Wednesday, the High Bailiff for Westminster (Mr. John Troutbeck) and a Common Jury were engaged in investigating a claim made by the St. James's and Pall Mall Electric Lighting Company against the Postmaster-General for damages for the alleged flooding of one of their mains, whereby the supply of electricity was interrupted. Mr. Llewellyn Davies appeared for the plaintiffs; and Mr. Clavell Salter represented the defendant. Mr. Davies said the Postmaster-General was empowered by Act of Parliament to lay down telephone and telegraph wires under the streets, and he was bound to make full compensation for any damage caused in consequence of the exercise of those powers. In January last, the Contractors working for the defendant opened a trench near the St. James's Theatre for the purpose of laying down telephone wires. The Company's mains were enclosed in culverts which were practically water-tight; but in the course of the operations, one of the defendant's workmen struck with his pickaxe a very old 2 inch water-pipe. The water quickly filled the trench, and made its way inside the culvert. It reached the boiling point in less than a minute, the consequence being that the fittings were broken and a short circuit resulted. The whole of the generating machinery at both stations was stopped, and the supply of electricity was suspended for half-an-hour throughout the district, and for an hour in the locality of the accident. A *matinée* was in progress at the theatre, which, save for a few gas-burners, was in darkness for an hour; and the Trocadero, which was wholly lighted by electricity and had no gas stand-by, was in the same predicament. Under an agreement, the Company had had to pay the Carlton Hotel Company a penalty of £10 for interrupting their supply; and the actual sum expended by reason of the accident was £165 10s. 6d., less £19 11s., the sum realized by the sale of the old wire, &c. This made the amount of their claim £145 9s. 8d.; but, in addition, he submitted that the Company were entitled to damages for the injury done to their business. Up to this time, there had never been a failure of light during the ten years of their existence. At the close of the evidence, Mr. Salter contended that, inasmuch as the damage was not done by the Postmaster-General "in the exercise of his powers under the Act," the plaintiffs could not recover. If they decided against him on this point, he should submit that the damage to the Company's reputations was too remote for consideration. The High Bailiff, in summing up, said he had no doubt the Jury had power, and it was their duty, to assess the damages in this case. The Jury awarded £145 19s. 6d. and costs.

MISCELLANEOUS NEWS.

SOUTH METROPOLITAN GAS COMPANY.

The Ordinary Half-Yearly General Meeting of this Company was held last Wednesday, at the Cannon Street Hotel.—Sir GEORGE LIVESEY in the chair.

The SECRETARY (Mr. Frank Bush) read the notice convening the meeting as well as the minutes of the last ordinary and extraordinary meetings.

The CHAIRMAN: Ladies and Gentlemen, my task is a very easy and pleasant one to-day. The motion that the report be adopted, and the accounts received, might very well be compressed into two or three sentences. It would be sufficient, I think—to paraphraze the first sentence in the report—to say that everything (with one or two exceptions) has been better than we expected. Those exceptions are that coal has not been cheaper. We expected it would have been cheaper; but we have been obliged to renew our contracts at the same price, or nearly the same price, that was paid in March of last year. Then there is another item which is certainly not very good, though it is as good as we expected; and that is the item of tar. I have often touched upon this question, and I dare say I may have some day something more to say about it. Tar only realized about 1d. per gallon, notwithstanding all the valuable products obtained from it. I think the cause is that we gas people are putting on the market more tar and tar products than the market can take—with the result that some of the most valuable are practically unsaleable. You will not be content, I am afraid, with just these few words; and I shall therefore venture to take up your time to some extent with a commentary on the report. It is the practice of the Directors to give as much information as we can to the shareholders in the compass of the report—in the space at our disposal—because we hold that the property is yours, and that you are entitled, and have a right, to as much information as possible. The second paragraph in the report refers to the reduction of 5d. per 1000 cubic feet in the price of gas. The gas was reduced by 5d. from June, 1901; but it is perhaps not fair to talk of a 5d. reduction, because at the same time the standard illuminating power was reduced from 16 to 14 candles. We did not reduce the quality actually supplied by two candles; but the standard was reduced to that extent, and we were free to make gas of 14 instead of 16 candles. Part of the reduction in price was made in consequence of the reduction in illuminating power; though I may say here that the gain to the consumers of 2d. per 1000 cubic feet for the two candles is more than the Company have been able to save by supplying gas at the lower quality. At any rate, the consumers during the half year have benefited to the extent of some £120,000; and I think I may say they have been just as well supplied, and just as well satisfied, with the 14-candle gas as they previously were with the 16-candle gas. In fact, I think they have been better satisfied, because the 16-candle was a quality we could not maintain without expensive, troublesome, and uncertain enrichments, and sometimes they got it and sometimes they did not. The second paragraph of the report speaks of products having realized £63,745 less; but, of course, coke sold at a lower price because coal was cheaper than in 1901. The saving of £139,415 in the price of coal, however, wants a little explanation. As I told you just now, we have renewed our coal contracts for the twelve months from March last at about the same price that we paid in March, 1901; but up to March, 1901, we were paying 7s. a ton more than on two-thirds of the supply of coal for the corresponding half of last year. We paid about £139,000 more than we have paid in the current half year. But the most satisfactory thing about the whole report is that the working in all particulars—as far as it is within the power of the Directors, and officers particularly, and workmen to accomplish it—has been more satisfactory than it has ever been. Whereas we have made 267 million feet more gas in the half year, we used 1700 tons of coal less. The half year to June, 1901, was a bad one—certainly we were not doing nearly so well as we ought to have done. But everything was unsettled by the difficulty about coal; and we did not make so much gas per ton as we ought to have done. In the past half year, however, there has been a great improvement all round. The actual difference between the two half years is 500 cubic feet per ton; but as the June half year was 200 cubic feet lower than it ought to be, we can only take credit for an improvement of 300 cubic feet. In the current half year, however, we shall find that the improvement has been more than maintained. And that is one result of the reduction of illuminating power. We are now able to work coal to the best advantage, and get the best result from it; whereas previously we worked at a disadvantage in endeavouring to obtain a higher quality than the coal would yield. These improved workings are due to the whole of our staff of officers and workmen alike. Word was passed round after the December half year that we were in a tight place; that we could not make both ends meet; and that every man must do his best in order to put us in a right position this June. We did not expect we should have made both ends meet; but happily we have done a good deal more than that—thanks to the efforts of all our people. The third paragraph in the report relates to the dividend; and here a few words are necessary. It has not been our practice to pay the full dividend to which we are entitled. Now at the price at which we are selling gas—2s. 3d. per 1000 cubic feet—the full dividend to which we are entitled is £5 6s. 8d. per cent. Why are we altering our policy? For a number of years we paid something short of the dividend because our reserve fund was so low. It had been depleted through those disastrous years 1889, 1890, and 1891, when we were trying to keep down the price of gas, and absorbed our reserve fund in the effort. For a number of years the shareholders gave up part of their dividend in order to increase the reserve fund; and the fund has now reached the respectable figure of £138,862. The insurance fund has also been increased during the last few years; and we feel, therefore, we are in a tolerably safe position. Not but that I should like to see the reserve fund larger still. It will grow by increments of interest; and if we are able to reduce the price of gas at some future time, we may not pay quite a full dividend, and add a little to the fund in that way. We are in a good position in this respect. Then there is another feature to notice. There seems every reason to believe that the current half year will be quite as good as the past one; and except for some totally unforeseen and unexpected accident—to which, of course, we are always liable—there is every reason to believe that we shall be in as good a position next February, to maintain the same rate of dividend as we now declare. The Directors, therefore, feel they are perfectly justified in recommending that the full dividend to which we are entitled should be paid. The £5 6s. 8d. is equivalent to 13⅓ per cent. on the old unconverted stock. At any rate, we have never paid a higher dividend, though we have been as high once. Then there is one other point about it. Why do we go by these odd amounts, £5 6s. 8d.? There is a very simple reason - in fact, there are two reasons. Our stock is divided into multiples of £5; and a great many shareholders have odd amounts of £5. The interest at 5¾ per cent. on £5 for the half year comes to 2s. 7½d.; so that one shareholder has to be calculated at 2s. 7d. and the other at 2s. 8d. But advancing by sixths instead of quarters per cent. we get even pennies. Then there is another advantage, going by sixths instead of quarters. We are able to divide more closely. Under the sliding-scale, for every reduction of 1d. we can increase the dividend by 2s. 8d. per cent., an odd figure; and dividing by sixths, we approach very nearly to the full dividend we are entitled to. We have every reason to believe this dividend will be maintained. I have already touched on the reduction of the standard illuminating power; but here is a singular thing. We contended two years ago in our application to Parliament that it was not in the interest of the consumers that gas of 16-candle power should be supplied. We convinced the Committee; and they gave us our Bill by which we were permitted to reduce the standard from 16 to 14 candles. Well, we were opposed, of course. The London County Council—a well meaning body, but not possessed of knowledge of all things—did their utmost to prevent it. They opposed in the strongest possible manner the reduction from 16 to 14 candles. They said: "If you reduce the quality by two candles, or by one-eighth, the consumers will have to burn about one-third more gas, (or one-fourth at any rate), in order to get the same amount of light." The result is, the consumer has not burnt any more gas at all. We have only an increase of 4½ per cent. on the half year. If the statements made before the Committee had been true, we ought to have had an increase of 20 per cent. for the consumers to have got as much light out of the 14-candle gas as they previously got out of the 16-candle. They have done quite as well, if not better. But here is the extraordinary thing. The very people who opposed us—and I give them the credit for coming round to the truth—have passed a resolution that next year they will promote a Bill (in conjunction with the Corporation of London) to reduce the quality of the gas supplied by the Gaslight and Coke Company from 16 to 14 candles. I think no stronger proof could possibly be given that the policy pursued by this Company, in taking the lead in a reduction of illuminating power, was the right one. Paragraph 5 of the report relates to another important matter. The rage for Municipalism or Municipal Trading is likely to produce disaster. Certain people called Progressives—I hope we are all Progressives in a true sense, but I never knew a word more prostituted than "Progressive"—have got themselves elected on Borough Councils. Many of them are simply Socialists in disguise. The result has been they have spent the ratepayers' money with a most lavish hand, going into all sorts of trading ventures of which they know nothing, and of which they have made a great mess. One has been the question of electric lighting. I have never said anything from this Chair in opposition to our friends, the promoters of electric light. I have never said one word against the Electric Light Companies; and we have never done anything to hinder them in any way. All we have done has been to try to promote our own business in the best way we could. But I have something to say against municipal bodies going into this trade. The parish of Newington started an electric light installation, on which they have spent about £80,000; and last year they allowed nothing for depreciation of plant. Of course, electric lighting plant depreciates very rapidly; and a considerable amount has to be set aside year by year to maintain it in a proper state of efficiency. They have had to pay off part of the loan; but they have made a very serious loss on their trading—a loss of £3000 or £4000 in the year. Where is this to come from? This is the iniquity of municipal trading. An ordinary trader, so to speak, takes his life in his hand. An electric lighting company go into a district; and if they cannot get business to pay them, they must put up with the consequence and lose their money. But a municipality does not do that. It can go on making a loss, and throw the burden of the loss on to people who do not participate in the benefit of their trade, so called. In Reigate, they started an electric light installation. The result has been a loss; and they have put up the rates 4d. (the Mayor of Reigate writes to tell me it is only 2d.) in the pound—making all the ratepayers pay for the loss incurred in supplying a small fraction of the people with electric light. Newington will do the same; and the rates in the parish are going up by "leaps and bounds." In one parish, the rates will be put up from 7s. to 10s. in the pound. I am not sorry in a sense, because the sooner the crisis comes, the better. When the people who have elected the "Progressives" find the rates have gone up from 6s. to 10s. in the pound, and that the landlords must, of necessity, increase the rents to pay the heavy rates, they will find they have made a mistake in electing these people, and they will turn them out. The parish of Newington have made a loss; and as they must make it up somehow, they will have to come upon the rates. Seeing that there were two boroughs in our district—Bermondsey and Woolwich—applying for Provisional Orders to extend their electric lighting, the Company opposed them, in this sense, as the Provisional Orders are granted by the Board of Trade, the Company petitioned the Board of Trade to put in a clause providing that the electric lighting should pay its way. That was all—that such a charge should be made for the supply of electric current as would pay all expenses, and thus the ratepayers would not be called upon to make good any losses. We put it on this ground, that we were among the

largest ratepayers in the boroughs, though we have no vote, or control over the expenditure. Here is a glaring case of taxation without representation. Railway companies, water companies, and joint-stock companies of every kind must pay rates; but they have no votes for the election of councillors. We pleaded that; but the Board of Trade did not see their way to grant our request. We went further. The Provisional Orders, when passed by the Board of Trade, have to be confirmed by Parliament; and the House of Lords Committee gave us all we asked, and inserted a clause providing that such a charge is to be made for "the supply of energy so that, as far as is reasonably practicable, the revenue for that year shall not be less than the expenditure for that year." That is to say, every year these municipal bodies supplying electric light shall make an estimate of what the cost of doing so will be—including all charges for the loan, interest on the loan, repayment of the loan, depreciation, management, and everything else—and charge what will make revenue balance expenditure. I think that is a rather far-reaching enactment. They wanted us to do this: They said: "We will give you a clause that will exempt you from paying any extra rate if we should not make the thing pay." But our Counsel would not accept that; and we have now got for all the ratepayers in those boroughs the protection against a charge to make up losses on the electric lighting undertaking. I think that will have some effect in stopping the rage for electric trading. And remember, it is not ourselves only we are thinking of—the consumers are our partners. If we had had to pay an excessive amount of rates to make up the loss, we should have charged it in the price of gas; and the consumer would have had to bear five-sixths of the burden. The next paragraph of the report refers to our last Bill in Parliament; and we there tell you we got all we expected. There were three points in the Bill. One was to acquire a large additional area of land in the neighbourhood of East Greenwich. The question arose, seeing the great increase of business (and we are now building new apparatus to manufacture 5 million cubic feet of gas a day) and the increased demand for gas in London, whether it would not be as well to take advantage of the opportunity of securing additional land while it was available. If we had not secured the land when we did, it would in the course of a few years have all been occupied in one way or other, and there would have been nothing for us to do but to go down to Erith. Parliament accepted our plea, and granted the necessary power. We have now given notice to purchase the land; and we shall have to raise the money to pay for it. But the payment of the interest will not be an appreciable burden to either the consumers or the shareholders. Another important part of the Bill the Committee did not give us. We asked for freedom from control of the London Gas Referees—that the great gas industry should be free from University Professors who know nothing about business. These gentlemen were appointed by a Semi-Public Act of Parliament, and the Committee did not feel it was a matter to be dealt with by a Private Act just at that moment. But we got what we wanted—a full hearing of the case; and we were able to put before a Committee of the House of Commons a full statement of the facts, showing the hardship on the consumers as well as the Company that follows the Referees enactment. The other matter related to the fees of the Directors; and that was granted. There is only one other point in which the Company has taken an active part; and that is in relation to the Welsbach incandescent lighting. Let me say here that, in starting this agitation, we had no idea or desire to do the slightest injury to the Welsbach Company. The motive we had in view was to get cheap and good mantles for the use of gas companies generally, and ourselves in particular. We were met by the Welsbach Company in the fairest and most reasonable manner; and we have obtained what I certainly should not have dared to expect or hope for a year ago—we have obtained from them conditions which enable us to either make mantles ourselves or buy them of any one on the payment of a small royalty. If we make mantles ourselves, we are to pay ¼d. per mantle royalty, and if we purchase them from abroad we have to pay ½d. royalty—¼d. for English made, ½d. for foreign made. One would not have dreamed a year ago that such results could be obtained. When we heard that mantles were supplied in Germany at 2½d. each wholesale, it was a dream to suppose that we could get them at anything like that price in England. A year ago in England the price was 7d. or 8d., but we now get them at a reasonable rate. And I wish to say here that there were a number of gas companies and corporations associated with us. A fund was subscribed; and in the six months since our last meeting, this agreement has been come to with the Welsbach Company. I have in my hand a form of agreement for signature by gas companies and gas undertakings, a copy of which has been sent to all gas undertakings throughout the kingdom. A large number have availed themselves of it; and I would ask those who have not signed it to take it up. It does not hamper them in any way; and it gives them the right to buy mantles on paying the small royalty I have mentioned. I fancy some are purchasing mantles, which are an infringement of the Welsbach patent, without paying a royalty at all; though I feel sure that gas companies would not do an unfair thing towards any one if they knew it. I put it to them, now that the Welsbach Company have made such an arrangement, that it is not quite fair to go to outsiders for mantles when they can get really good and cheap mantles on the terms proposed. While speaking on this subject, there is just one point that I wish to mention. At the meeting of the Gaslight and Coke Company, in the speech read by the Governor—and it was the speech of the Board, because it is always written and discussed by the Board before it is read to the shareholders—there was a statement that the Welsbach Company had approached them; and that they had made a very satisfactory arrangement. The inference from that was that all the money and trouble which had been expended on getting this agreement with the Welsbach Company was unnecessary and useless. If the Gaslight and Coke Company had been able to make an equally good arrangement without any trouble, surely all that we had done was waste. But it so happens that I inquired of the Welsbach Company if they had approached the Gaslight and Coke Company; and they tell me they have not. That, I believe, is a mistake of the Board of the Gaslight and Coke Company in making such a statement; that really it was ourselves, or the associated Gas Companies, who approached the Gaslight and Coke Company, for we sent a circular with a copy of the agreement to every gas company in the United Kingdom, and I am sure the Gaslight and Coke Company have precisely this form of agreement in essence, only it is written and not printed. The printed form contains this statement: "Whereas, as the result of negotiations entered into by Mr. George Livesey on behalf of the South Metropolitan Gas Company with the Welsbach Company for the purpose of securing incandescent mantles at a satisfactory price," and so on. The Gaslight and Coke Company it seems objected to sign an agreement which contained my name—(laughter); and the Welsbach Company very properly said: "There is no difficulty about that; we will write the agreement out, and omit Mr. Livesey's name." I do not want to make any more of that. I can only say a great impetus has been given to the use of incandescent mantles; and we are benefiting by it—not by the increase in the consumption of gas, because it reduces it, but it enables us to hold our own against competitors. There is one further remark I wish to make; and that is with reference to the great question of Capital and Labour. I think perhaps some of you may have noticed in our accounts the very serious and large item: "To profit-sharing for twelve months ended June 30, 1902, £25,660." It so happens that the whole of the profit-sharing is charged in this half year. We were so badly off that we could not charge anything on account last time; but had we been in funds, we should have charged £12,000. The shareholders have a good right to say to us: "Are you doing right; are you getting money's worth?" Here is a large item in the accounts; are you justified in devoting so large an amount to this purpose?" for remember we are paying full wages, and this is something beyond the wages received by our workmen. Well, I think we are. I think we are getting full money's worth. I think that the whole of the money is earned by our staff and workmen; and if so, they have a right to it. But I think I may say something more. The most important industrial question affecting this country now, and has been for some years, and will be for some years to come, is the question of the relation of Capital and Labour. If employers and employed can be induced to work together loyally for the mutual good of all, then I have no doubt whatever that England will hold her own whatever may be the competition. If they are pulling against each other, there is a very bad look-out for us indeed. What have we seen lately in South Wales? A Judge of the High Court has declared that the men in proclaiming "stop days" were justified, because it was to their interest to stop working in the coal mines of South Wales in order to keep up the price of coal—it is to their interest, as their wages are governed by the price of coal. If coal is dear, they get higher wages; if coal is cheap, their wages come down under the sliding-scale. And the Judge actually said that the men were justified in stopping work because it was to their interest to do so. But what about the public interest! Where does the public interest come in? If it is the interest of the coal miners and coalowners to keep up the price of coal, it is to the disadvantage of everybody else. Happily that business is in very good hands. There is a gentleman I know connected with South Wales, Sir William Lewis, one of the men who is doing the grandest work for this country in resisting the tyranny of Trade Unions; and there is another man doing very fine work in the same direction, Lord Penrhyn. We are doing what we can to reconcile Capital and Labour; and after very much thought on the subject, I can but come to the conclusion that the only certain method of reconciling Capital and Labour is to make the labourer a capitalist. If you can let him share in your prosperity in that way, he will have an interest that nothing else will give him. Simple profit-sharing is not much use. If the £25,660 were distributed as cash yearly, it would do more harm than good. But when I tell you that out of the £25,660 (the men can withdraw half, and half is invested in stock), only £1700 was withdrawn in cash, I feel sure you will agree with me that this is a step in the right direction. We allow the men to deposit with us week by week anything they like out of their wages; and over £12,000 was deposited within the last twelve months. They have withdrawn from their savings £6000—they deposit it to provide for their holidays. But of the profit-sharing, only £1700 out of the £25,660 has been withdrawn, which is a very satisfactory result. They hold a large amount of stock in the Company; and three of the employees sit on the Board as our colleagues, and I am sure they are doing their duty here as thoroughly as any of us. I believe this, that the joint-stock system has made the middle class of England. Going back a hundred years or so, where was the middle class? They were few in number, and poor. Now look at their enormous wealth in the aggregate. The middle class have built the railways. But the working class have no share or lot in the matter. We are trying to bring them into it; and I hope that the work of the twentieth century will be to do for the working classes in this country what the nineteenth century did for the middle class—make them partners in all the great industries of the country. If what we are doing is helping in that direction, you will not grudge the £25,660 which was made over to your employees during the past year. I will not further occupy your time, but will conclude by moving the resolution for the adoption of the report and accounts.

Mr. Simpson Rostron: I have very great pleasure in seconding the motion. After the very full statement of the Chairman, it would be utterly out of place if I were to occupy your time with any remarks; but there is one thing I should like you to take away in your minds, and it is that, in consequence of the illuminating power of our gas having been reduced, we are able to make and sell more gas out of a ton of coal than we were before. This half year we have done that to the amount of some 4½ or 5 per cent.; but the Engineer tells me we are going to improve upon that. Therefore I think you may look forward to the gas industry being more prosperous than it has been hitherto.

A Shareholder, after expressing his concurrence in the policy of the Board in making the men partners in the concern, said he was pleased to learn that the result had been to obtain a greater yield of gas per ton of coal carbonized; and he hoped the Company would have many imitators in this respect.

Mr. H. Hounsom, referring to the honour which had been conferred

upon the Chairman by the King, said he supposed he should not be wrong in saying there was no man in England who valued a title less and yet no man who valued it more. As a shareholder of the old Phœnix Company, he could remember the time when jealousy existed between that Company and the South Metropolitan Company; and it was said that the works of the South Metropolitan Company were in such a condition that if an extraordinary breeze occurred they would tumble down. All this jealousy was now a thing of the past; and the wonderful success of the amalgamation was due to the indomitable pluck and perseverance of their Chairman. While the shareholders had been very loyal to the Chairman, they could not but admire his extreme honesty and wonderful perseverance. He heartily congratulated the Chairman that the King had been pleased to confer the honour of Knighthood upon him, and hoped he would long live to serve the Company in his new capacity.

The resolution was then put and carried unanimously.

Mr. JOHN MEWS proposed—"That a dividend at the rate of 5⅓ per cent. per annum be now declared, and that the warrants be transmitted to the registered addresses of the proprietors by post." He said as they had been discussing the business of the Company, and the way in which it had grown, perhaps a few figures taken from past years might be of some use to show how the Company had grown. Starting with 1885, when the Woolwich Company was amalgamated with the Company, the capital of the Company was 2⅓ millions; the amount of capital required to turn out every 1000 cubic feet of gas sold being 10s. 9d. In 1890, the capital was about 3 millions; and for every 1000 cubic feet of gas sold, a capital of 9s. 11d. was required. In 1895, the capital was 3⅓ millions; and for every 1000 cubic feet of gas sold the capital needed was 9s. 0¾d. In 1900, the capital was a little over 4 millions; but for every 1000 cubic feet of gas sold they only needed 7s. 11d. of capital. This was very satisfactory; and he might say that the figures for 1901, and for the present half year, were much the same—viz., 7s. 11d. of capital. There was a considerable difference between 10s. 9d. and 7s. 11d., though this might not convey very much to the meeting, as it was more or less of a technical character. He would therefore put it in an easier form. Last year about 11 million thousand cubic feet of gas were made by the Company; and if they had required the same amount of capital in 1901 as they did in 1895, they would have had to have £5,000,000, whereas the capital was only £4,370,000. This meant that they had saved rather more than £600,000 of capital in six years. Going farther back and taking the year 1885 as compared with 1901, when they had 11 million thousand cubic feet of gas, it would be seen that at 10s. 9d. per 1000 cubic feet the Company would have required a capital of £6,000,000, whereas they only had £4,370,000—in other words, they had saved one-and-a-half millions of capital.

Dr. DRYSDALE asked how this amount had been saved.

Mr. MEWS said it was by the business increasing in a greater ratio than the capital.

Mr. J. A. BUTCHER, in seconding the motion, expressed the pleasure which the profit-sharing arrangement had given to the employees of the Company, and which had been the means of conferring a lasting benefit on many who had served the Company well. He felt sure that the present rate of dividend would be maintained; but if it was not, it would not be the fault of the employees.

The resolution was passed unanimously.

The CHAIRMAN next moved—"That the Directors be and are hereby authorized to raise the sum of £500,000 further capital by the issue of ordinary stock and debenture stock in such amounts, at such times, and in such manner, as they may deem desirable, pursuant to the powers contained in the Company's Acts, 1882, 1896, and 1901." He said as the business increased the capital must increase; but he could assure the proprietors the Directors would not spend anything on capital account which could possibly be avoided. The business was increasing in much greater ratio than the capital; and that being so, the increase was perfectly safe.

Mr. ROBERT MORTON seconded the motion, which was carried unanimously.

Dr. DRYSDALE proposed a hearty vote of thanks to the Chairman and Directors for their able management of the Company's affairs.

The motion was carried unanimously.

The CHAIRMAN, in responding, said; Ladies and gentlemen, on behalf of my colleagues and myself, I have to thank you for this very kind vote of thanks. It is a great pleasure to us to meet the shareholders and to see such an interested and large gathering, especially at this slack time. It is an encouragement to us to do our best to promote the Company's interests. With regard to a personal matter, I must thank you very heartily for your kind expressions, and especially I thank Mr. Hounson for what he said. I can only say this, that it was a very pleasing thing to our workmen. I did not know that the list of honours would be published on the 26th of June, the Coronation Day—in fact, it was announced the day before that it would not be published till the King was out of danger; but on the Thursday the list appeared. I do not get my paper till after breakfast, and while having my breakfast I received this telegram: "Sir George,—Hearty congratulations from Old Kent Road workmen." A few minutes afterwards came another telegram from the workmen at East Greenwich to the same effect. I hope the honour I have received will be the means of increasing the good that one can do in helping forward the great work of reconciling capital and labour. I am sure we are all delighted at the wonderful recovery of our King. That is the best thing one can talk of at this moment—that the King is well and restored to us in health and strength; and let us hope he will be for many years in that state. Before sitting down, permit me to move a hearty vote of thanks to our officers and workmen, for the excellent manner in which they have performed their duty to the Company; and I couple this vote with the names of Mr. Carpenter and Mr. Bush. All are working heartily together. There is a feeling of goodwill from the highest to the lowest; and that is one great cause of the prosperity of this Company.

The motion was carried unanimously.

Mr. CARPENTER said it was with more than usual pleasure that he rose, on behalf of the engineering staff, to thank the shareholders for their kind vote. They were all familiar with the part which Sir George Livesey had taken in bringing about the reduction of illuminating power from 16 to 14 candles, and it had been the duty of the engineering staff to move along the path thus laid down. This work had been satisfactorily commenced, and he had no doubt that in time they would arrive at the state of perfection which they hoped to reach. The results which had attended all the working, so far as it had gone, had amply justified the wisdom and foresight of the promoter. The duties of the staff widened each half year; and had it not been for the enormous help which the profit-sharing system gave to those in authority, it would have been impossible to give the requisite time and attention to the Company's work, and so bring about the results which had been achieved. On behalf of the engineering staff, he thanked the meeting most heartily.

Mr. BUSH said in the first place he wished to express the great pleasure and delight it gave all the employees when they heard that the Chairman—our Mr. Livesey—was to receive the honour of knighthood. He could only express the sincere hope that the Chairman might be long spared to preside over the meetings of the Company, and that those who were associated with him might continue to be so, and help to assist in carrying out his enlightened policy. With regard to the accounts, there was just one matter to which he should like to refer. It might appear as though the savings by the workmen in the half year were less than usual; but this was not so. The workmen's bonus and savings deposited with the Company stood at £18,288, against £24,000 for the corresponding period of 1901; and their enemies might say that the workmen were not so thrifty as before, or that they had not the confidence in the Company which they at one time had. Fortunately neither of these statements was correct. What had happened was this: The Trustees had invested a large amount of the savings in the stock of the Company. The actual amount on deposit was £76,838, against £57,545 for the corresponding period; so that it would be seen that during the year there had been no less a sum than £19,000 added to the amount. There was invested at the present time £58,000 in £43,950 of stock, which stock would be wanted from time to time for distribution among the employees. The reason the amount had fallen was because the Trustees had invested this large sum of money. In addition, the employees held as shareholders, in their own names, £91,526 of ordinary stock, worth about £110,000.

A SHAREHOLDER, with a view to its being recorded on the minutes, moved—"That this meeting heartily congratulates the Chairman upon the well-deserved honour that has been conferred upon him by the King."

Another SHAREHOLDER, in seconding the motion, said it came as a very gratifying piece of news to those who knew the Chairman—and there were but very few to whom the name of Livesey was not well known. In some cases where honour was conferred one had to search books to see who the person was, and what he had done; but that was not the case here, as the name of George Livesey was universally known.

The motion was carried by acclamation.

The CHAIRMAN: I thank you again from the bottom of my heart.

The proceedings then closed.

CRYSTAL PALACE DISTRICT GAS COMPANY.

Sir George Livesey on the Price of Tar.

The Half-Yearly Meeting of this Company was held last Friday, at the Albion Tavern, Aldersgate Street, E.C.—Sir GEORGE LIVESEY in the chair.

The SECRETARY (Mr. Charles M. Ohren) having read the notice convening the meeting, the Directors' report and the accounts, which were summarized last week, were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said in his first remarks he must deal with the paragraph in the report which announced certain changes on the Board. In one sense this was a sorrowful meeting to them all. Since the last meeting two of the Directors' colleagues—Dr. Hetley and Mr. Bryan Donkin—had been called away. Dr. Hetley was the largest shareholder in the Company, and had been on the Board for 4¼ years. He (the Chairman) had been a Director for 27 years; and he could say that, during the whole of this time, Dr. Hetley had proved a most worthy colleague. He was a man who was (he was going to say) beloved by them all—he was certainly very greatly respected and esteemed, and took a great interest in the welfare of the Company. He was a man of broad views and liberal mind, and had proved of great service on the Board for many years. He had attained the great age of 81; but the Directors deeply regretted his loss. The other Director whom they had lost was a younger man, and a much younger member of the Board. Mr. Bryan Donkin, who was one of the most eminent and highly scientific mechanical engineers of the day, only joined the Board a year ago. From the time he became a Director, he took the very greatest interest in the business of the Company, as their Engineer (Mr. S. Y. Shoubridge) could testify. He was a man with whom his colleagues could work in the most cordial and pleasant manner, and was moreover a Director who was of great service in many ways. They had to mourn the loss of these two gentlemen; and he desired on the part of the Directors to express the great regret they felt at the loss the Company had sustained. The report, he was happy to say, was a satisfactory one. It was summed up, in fact, in the first paragraph, which said: "The Directors have the pleasure to state that the result of the half-year's working has been very satisfactory, following as it does a deficiency in the December half year, due to the reduction of 3d. in the price of gas to 2s. 7d. per 1000 cubic feet from June, 1901." This reduction of 3d., there was no doubt, was rather too much; for in the December half year—the first half year at the reduced price—the profit was considerably short of the amount required to meet the dividend and interest; in fact, they were nearly £3000 short. According to the price of gas, the proprietors were entitled to a dividend of £5 7s. 6d.

per cent.; but to pay even 5 per cent., they had to absorb not only the undivided balance of about £2600, but were £336 to the bad. He confessed that they were all rather afraid that in the half year now under review (while they expected it would be considerably better than the December half year), they would not make both ends meet. But when they found instead that they had a good surplus, it was a matter of great satisfaction to the Directors and officers. The report explained that the profit on the revenue account was £21,432. Out of this they had to meet the adverse balance of £336, pay £200 interest on temporary loans and £2591 on debenture stock, and a dividend of 5 per cent. on the preference stock, amounting to £1500. They then had £16,800 left, which would enable them to declare a dividend of £5 6s. 8d. per cent. The dividend to which the proprietors were really entitled was £5 7s. 6d. For every 1d. reduction in the price of gas under the sliding-scale, they were entitled to an extra dividend of 2s. 6d. per cent.; but they could not divide half-crowns, as this would come to farthings in calculating the dividends. The stock was divisible into multiples of £5; and there were many holdings with odd amounts of £5. Even to pay quarters per cent. involved halfpennies. If they paid 5¼ per cent., the dividend for the half year on £5 of stock would be 2s. 7½d. If, however, they gave one-sixth per cent. at a time, or increments of 3s. 4d., they got to even pennies in the calculation of the dividend. There was something in this. It was a convenience certainly in the book-keeping; and there was another advantage. By going up by ⅓th per cent. they were able to pay closer to the dividend to which they were entitled. Take, for instance, the present case. The proprietors were entitled to £5 7s. 6d.; if they went up by ¼ per cent., they would pay £5 5s. By going up ⅓th per cent., they paid £5 6s. 8d., which was as close as they could conveniently get to the full dividend. However, the increase in the dividend was a material one; altogether it amounted to nearly £1000. Still, after meeting this additional dividend and transferring the small balance of £119—that was the difference between the £5 6s. 8d. and £5 7s. 6d.—to the reserve fund, they had £1350 to carry forward. This being so, the Directors felt they would be justified in recommending the payment of practically full dividends. They would not recommend this if they did not feel reasonably assured—barring totally unforeseen and unexpected accidents—that they would be able to maintain it. There would be a further reduction in the price of gas some day—perhaps not just yet; but at any rate the proprietors might feel satisfied that the dividend of 5¼ per cent. would be the standard for some time to come. This was all very satisfactory; but there was something to be said on the other side. The Directors were a little disappointed in not getting coal cheaper. They expected that the price would have gone down somewhat in the twelve months between March, 1901, and March, 1902; their contracts extending from March to March. But as a matter of fact they were obliged to renew their contracts for the current twelve months at about the same price as they paid in the preceding year. There was a big drop in March, 1901; but they had not got any further. Coal was still considerably higher than the Directors thought it should be; and considerably higher than it was two or three years ago—certainly 2s. or 3s. per ton higher. All they could do was to hope it would drop in price again. Products had also gone down, and the price of gas had taken something off their income. But while on the subject of products, he might mention that there was one which was rather a serious matter. He referred to tar. Whereas in the six months to June, 1901, they received £2900 for tar, in the past half year they only received £2264. Tar was, in fact, worth only about 1d. per gallon. He could go back fifty years in gas matters; and, even in those days, the value of tar was about 1d. per gallon, and nothing was obtained from it, but naphtha, pitch, and dead oil. Now, what was not got from tar? And still it was of no more value than it was when practically nothing but the crudest products were derived from it. The secret of this he thought was that more tar was produced than the world required. In the cases of other commodities, it was different. If, for instance, more iron was produced than the world required, the blast-furnaces were closed down and the ironworks were stopped; production was reduced, and so a level was attained. The same thing, he understood, applied to even such things as diamonds. He believed that the success of the De Beers Company was due to their feeding the market with just as many diamonds as it could take, and keeping back those that would tend to depreciate it. But in the case of tar, they could not very well reduce the make, though gas undertakings he thought might do something in the matter. A great deal of tar might be burned as fuel. Tar at 1d. a gallon was very valuable as fuel. The Company had sold some to Railway Companies and others for that purpose; and if gas undertakings generally could sell and use a portion of their production as fuel (the Company burned some themselves under their boilers), they would do something towards raising the price by reducing the quantity on the market. As he had said, tar was worth 1d. a gallon some 40 or 50 years ago. Then the aniline dyes were discovered; and the price went up somewhat. About 1870 another discovery was made. It was found that, by the distillation of tar, anthracene, or artificial alizarine could be produced. It was the essence of madder which was the source of the red dyes. The substance used for Turkey red was obtained from the madder root; and there was an enormous demand for it. This new product of tar was found to be convertible into an artificial dye precisely the same. The anthracene which was distilled from tar actually sold in those days at £140 a ton; and it drove madder out of cultivation. It also put up the price of tar. In one case—that of the West Ham Gas Company—4d. per gallon was obtained for tar, instead of 1d., merely through this discovery. But then the price of anthracene was gradually reduced from £140 to £90, £60, and so on, simply because the supply was exceeding the demand. And at last—five or six years ago—it got down to about £15 a ton. At that time, the tar distillers of this country thought that it was wise to do something. The anthracene was sold to the German colour makers, who were a compact body; and they managed to buy to the disadvantage of this country. Large stocks were accumulated in Germany, therefore they were independent of the sellers. But tar distillers of England put their shoulders to the wheel with the object of trying to hold the anthracene on this side, instead of on the Germans side. They put up the price from £15 to about £30 per ton, and then went to the Gaslight and Coke Company, and asked them to join them. The Company replied that they disapproved of combinations of this sort; but they said, "We have a considerable stock of anthracene which we will sell to you; but you must pay us £35 a ton for it." The associated tar distillers of England paid about £35 per ton, and secured the stock. But the Gaslight Company continued to make anthracene; and, in a year or two, they had another stock. This they practically sold against the associated tar distillers to the German manufacturers; and so the arrangement was broken up. The anthracene for which the Gaslight and Coke Company were paid £35 per ton by the tar distillers, was afterwards sold at about £10 or less. At this moment, anthracene was practically unsaleable; and the German people now said, "If you will improve the manufacture, and if you will do part of the work we have had to do in the conversion of the stuff into colour, we will buy it of you." However, he believed it could not now be sold for even £3 a ton. Only the other day an eminent German chemist, who is connected with the great colour interests of Germany, called upon him; and he (Sir George) asked him whether anthracene was still being used. He replied, "Yes. It is the source of the red dyes; and there is as much anthracene wanted to-day as ever." But on this side more was being made than was wanted; and so those interested in anthracene here were at the mercy of the German colour makers. Their friends on the north side of the river were the people who had spoilt the market, and were still spoiling it. This was a disadvantage. But still, notwithstanding, the Crystal Palace Gas Company were in a satisfactory position. The report spoke of the variety of causes to which this satisfactory position was due. He had already spoken of coal; but he had not mentioned the increase in the consumption of gas. This was about 4¼ per cent., which the Directors considered most satisfactory—more especially bearing in mind that there was a reduction in the quantity of gas used owing to the introduction of the incandescent mantle. A room that had previously been lighted by three burners was now better lighted by one, besides which nearly all of the public lamps in the district had been converted to the incandescent system. This, of course, had tended to reduce the consumption of gas. However, they did not object to this. They believed in it, and liked it; but it had the effect of checking the increase in the consumption of gas. Notwithstanding this, they had an increase of 4¼ per cent., which was close upon their neighbours the South Metropolitan Gas Company, who had an increase of 4½ per cent. It might be of interest to the meeting to mention that that Company had reduced the illuminating power of their gas to 14 candles; but this had not tended to cause any greater increase in the rate of consumption. This proved, he thought, that gas of a high standard was a mistake, and was of no advantage whatever to the consumer. He got, as a matter of fact, as good a light with a low standard gas as with a high one. To obtain a high quality gas, they were obliged to use oil gas or some other form of enrichment. In their own case, they employed carburetted water gas, or oil gas. But he called all such forms of enrichment adulteration; and the less they had to do of that kind of thing, the better for them. In the paragraph of the report dealing with the causes of the favourable result, was a statement that he could not pass over. It was this: "The feature, however, that gives the Directors the most satisfaction is the good service rendered generally (for, of course, there are some exceptions) by their officers and workmen." These good results would not have been attained unless they had thoroughly loyal and devoted officers; and the Directors felt they were greatly indebted to the officers for the energy and ability and devotion to the Company's service that they had displayed. But happily it did not end there. Their chief officers could not do much unless they were backed up by their subordinates, and the subordinates could not do much unless the workmen did their part towards promoting the prosperity of the Company. The Directors considered this was largely due to the Company's system of profit sharing. The simple term "profit sharing" wanted a little explanation. It usually took the form of the distribution of a bonus in cash annually; but this did not do much good. If, however, they could arrange it in such a way that the recipients—the employees—put the bonus by and invested it, so as to improve their position and make provision for old age and rainy days; if they could make them capitalists or owners of property, then they gave them a new interest in life. If, further, the property the workmen held was in the Company's stock, they had a new and a much stronger interest in the prosperity of the Company. This was what the Directors had endeavoured to do in this Company. The workmen now held about £10,000 of the Company's stock, which he might say was entirely the result of the profit-sharing system. The bonus was payable half in shares and half in stock. This last year the amount of bonus was £2062—£1062 appeared in the June accounts, and £1000 in the accounts of last December. About £1000 of the total amount was at once invested in stock, and the other £1000 was payable in cash. As he had said, the men held £10,000 in stock; and they had a considerable amount deposited with the Company in the shape of savings—something like another £2000. The bonus was declared on the 30th of June. The men's books were then made up, and they showed that so much was invested in stock, and so much was withdrawable. For the past year only £200 was withdrawn; and the greater part of this was the men's own savings. The amount of the withdrawable bonus that was actually withdrawn was infinitesimal—only amounting to £30; and this was a matter of much gratification. The Directors encouraged the men to deposit their savings with the Company. They said to the men, "If you like to leave 6d. or 1s. or 2s. a week out of your wages for us to take care of, we will allow you interest on it, and you can withdraw it at any time." A good many of the men did this, and saved the money for their holidays and other purposes. Now, if the men continued to increase the amount of their holdings in the Company, the time would come when they should be represented on the Board. It had been tried in another case, and had been found to succeed; and if their own men were going to hold a large proportion of the stock of the Company, it would be only fair and right that they should be represented on the Board. To do this, the Company would have to get parliamentary authority; but some day they would have to go to Parliament, and then it could be done. This was his own idea; but his colleagues had no objection to him stating

it now. When the men's holdings had increased to (he did not bind himself to the amount) £15,000, or something like that, then the time would have come when they should elect their own representatives on the Board. It was an innovation; but it was a safe one. This industrial problem was the most serious one with which British industry had to deal. The common tale everywhere was that although wages had been largely increased, work had been largely reduced; and this, in his opinion, was because the men had no direct interest in their work. But make the labourer the capitalist, and he would have a direct interest in the work. That morning he (the Chairman) was at Putney; and there, as in most of the suburbs of London, he could not but note the wealth of the middle classes. A hundred years ago, the middle class was small in number and comparatively poor. Now they were the owners of untold wealth. It was by their savings that nearly all the railways and joint stock enterprises had been carried on. The savings of the middle class, aided and encouraged by the joint-stock liability system, had created this enormous wealth, and made the middle class in the Nineteenth Century what it was to-day; and he hoped that the Twentieth Century would see the working class lifted, by becoming participants in the joint-stock system, into the position of capitalists. Then would the labour difficulty be solved. As to other matters in the report, he remarked that the Company joined with other gas undertakings in the movement that resulted in the satisfactory arrangement by which the gas industry had obtained cheap mantles. The Company had also adopted the incandescent burner maintenance system; and this was working very satisfactorily. The last words he had to say had reference to the filling of the two vacancies on the Board. It was the duty of the Directors to select the gentlemen to fill vacancies that arose. It might be said that the proprietors ought to deal with this matter. Theoretically, no doubt, that was right. He was somewhat of a democrat in this particular; and he had often thought it was only fair the shareholders should select their own representatives. He had given a good deal of consideration to the matter; but he did not see how they could select them—inasmuch as they did not know their fellow-shareholders in the same way that the Directors did. The Board had made it their business to particularly examine the list of those proprietors who held the £2000 of stock necessary to qualify for seats on the Board, but in vain. The Directors felt that preference ought to be given to old shareholders, supposing them to be qualified and suitable for the post. Three or four months ago they elected Sir Fortescue Flannery, M.P., who had been a shareholder for some years, and was eligible in every respect. In the short time he had been on the Board, he had shown them that a satisfactory selection had been made. Regarding the other vacancy, as there happened to be no hurry about it, they let it stand over for a time. They could not then find a man among their old shareholders. But it so happened that Mr. Charles Hunt, who had been Engineer for a great many years to the Birmingham Corporation Gas-Works, and was a man well known in the gas world, had resigned his appointment. He had plenty of life in him yet, and, he (the Chairman) hoped, many years of useful work before him. They learned that Mr. Hunt was coming to London; and as he had been a shareholder for 25 years, had held the necessary qualification for a number of years, and was unquestionably a thoroughly suitable man for the post of Director, the Board had appointed him.

Mr. C. Lea Wilson seconded the motion; and, after an expression of satisfaction with the position of affairs by Mr. A. W. Oke, it was unanimously adopted.

Proposed by the Deputy-Chairman (Mr. Robert Morton), and seconded by Mr. Jabez Light, a dividend was declared at the rate of 5 per cent. per annum on the preference stock and 5½ per cent. on the ordinary stock, less income-tax.

The thanks of the proprietors were next accorded to the Chairman and Directors, on the proposition of Mr. Oke, seconded by Mr. Thomas Guyatt.

The Chairman, having responded, moved a similar acknowledgment of the services of the officers and the employees generally.

Mr. Charles Hunt seconded the motion; and it was also heartily agreed to.

An acknowledgment by Mr. Shoubridge and Mr. Ohren concluded the proceedings.

CROYDON COMMERCIAL GAS AND COKE COMPANY.

The Half-Yearly Meeting of this Company was held last Friday, at the Small Public Hall, Croydon—Mr. Charles Hussey, J.P., in the chair.

The Secretary (Mr. W. W. Topley) having read the notice convening the meeting, the reports and accounts were taken as read.

The Chairman, in moving their adoption, first referred with great satisfaction to the particularly gratifying character of the balance-sheet. Passing on, he remarked that it was with sincere regret that he had to allude to the death, since the last meeting of the proprietors, of a very old servant of the Company—Mr. Charles Farrand. He was the Manager of the Company when its dimensions were very small indeed, and when the works were situated in Overton's Yard in Surrey Street. The Company then possessed two holders which only held 4000 cubic feet each—one being for the supply of gas during the day, and the other for the supply during the night. The storage was afterwards added to at Pitlake, and there the Company went to the extravagant extent of building a holder with a capacity of something like 100,000 cubic feet. (Laughter.) To-day, they had four gasholders, the largest of which held about 3 million cubic feet. These figures alone showed the very rapid strides that had been made by the Company between the year of its incorporation in 1847 and to-day. Mr. Farrand accompanied the works when they were removed to their present site at Waddon; and then he retired in 1877 on a superannuation. Turning to the events of the half year, he said that since the proprietors last met, £15,000 of the consolidated "C" stock had been sold. First they disposed of £10,000 of the stock in London; it being thought that this was rather a large amount to put up to auction in Croydon, and that it might realize a better price in London. The average price obtained was £193 12s. 4d. per cent. At a later date, they sold the other £5000 in Croydon; and he was pleased to say that they made a much better price. But if they had placed the larger amount on the local market, it was not at all likely that they would have received for it such a high price as they did for the smaller amount. The average price obtained for the latter was £199 3s. per cent. This must be as highly satisfactory to the proprietors as it was to the Directors. Of course, it was absolutely necessary to raise the capital; for as most of the proprietors were aware, they were now engaged at the works in largely extending their retort-house plant, and in increasing the use of machinery. He ought to mention that, in selling the stock, the Directors made a slight departure, and one with which they were very highly satisfied. In order to give small investors, consumers, and others to whom it would have been inconvenient to attend the sale, an opportunity to invest in the stock, an invitation was issued asking them to send in particulars as to the amounts they would like to purchase; and the Deputy-Chairman and himself were deputed to represent these investors at the sale. The result was that the auctioneer had placed in his hands a sum of £4960 from people who were prepared to pay £200 per cent. if necessary. But, of course, they paid the average price realized. This stock was acquired by 104 persons; and the number of proprietors now was between 900 and 1000. Another new departure for the Company was that, in view of the reduced cost of incandescent mantles and burners, and to encourage the consumers to adopt this system of lighting, the Company had undertaken, for a very small charge per burner, to maintain and keep the lights in good order. Regarding the capital account, since the last meeting they had expended on the works £7163. In the first place, £825 had been spent on a new locomotive. Then they had expended £3700 for the extension of one of the retort-houses, and compressed-air stoking machinery. They were also erecting a new boiler-house. In this latter connection, they had spent £1900; and they hoped to have the work completed in time for use in the coming season. A sum of £600 had also been expended towards the construction of a new overhead water-tank, of a capacity of about 110,000 gallons. The Directors believed this would well repay them, because, instead of using the Corporation water, which cost the Company a "good bit" per annum, they would be able to pump water from their own wells, and store it in this new tank. Then, during the half year, they had laid out £2039 on mains. This represented 3 miles of mains laid in twenty-two roads; and the extension of their system had brought them an additional 1028 service-pipes, which they hoped in time to connect up to the houses already built, and to be in readiness for other houses when they were built. They had also spent £664 on new meters. This was in addition to the number they had purchased to replace old meters. The increase in the half year in the number of consumers was 819. On new stoves, they had spent £1499; and the increase in the number on hire was 881. The capital charge for this purpose appeared small in comparison with the increase in the stoves—which were chiefly cookers—let out on hire; but he would explain this when referring to the item "repairing and renewing gas-stoves." Then they were happily in the position of being able to write off £1000 from the disused plant at the old Carshalton works. The fresh additions to capital account made the total expenditure £430,046. Having referred to the purchase of premises for offices and show-rooms in the increasing district of Purley, the Chairman proceeded to say that the quantity of gas sold showed an increase, compared with the corresponding period of 1901, of 4·75 per cent., which represented about 20 million cubic feet. He had compared this percentage increase with many other companies, and their own came out very well—in fact, he had only seen two or three who had obtained such a large increase as this. Although they reduced the price of gas by 2d. per 1000 cubic feet from the Lady-day quarter, they had an increase of £1515 in the receipts for gas. Seeing that 2d. reduction on the half year's consumption represented £2870, this result was highly gratifying. Unfortunately, they had had a decrease in the receipts for public lighting, amounting to £277; and this was accounted for by the fact that the Croydon Corporation had done away with some 120 of the gas-lamps formerly used along the route of the electric tramways. The receipts from residuals, he was sorry to say, showed a reduction of £1501. Coke had averaged 3d. per cwt. less for the six months than in the June half of last year; and tar was also a bad feature. He was, however, pleased to inform the proprietors that they had made an advantageous contract for tar which would show a very handsome increase on the next half year. The receipts for sulphate of ammonia were most satisfactory; there having been an increase of £909. This was accounted for in two ways. First, they had realized 19s. per ton more; secondly, they had made 23¾ lbs. of sulphate per ton of Durham coal carbonized, whereas 22 lbs. was considered an excellent result. This, of course, was due to improved working. They had, on the recommendation of Mr. Helps, put their sulphate plant into thorough good repair; he hoped their Engineer would be able to continue to show similar excellent results in this respect. Coal and oil decreased in cost to the extent of £13,606, through the lower prices ruling. They were able to make their contracts for coal at 7s. 3d. per ton less than for the corresponding period of 1901, and oil was costing 2d. per gallon less. Repairs and renewals of works were £524 more; and in addition to this the £1000 written off the old Carshalton works was charged to revenue. The repair and renewal of stoves cost £804 more; and this was to a large extent accounted for by the fact that they had put on extra hands to renovate the large number of used stoves that were in store. These stoves were now being sent out again; and in this way capital expenditure had been kept down. The final result was that, after providing for all fixed charges, writing £1000 off the old Carshalton works, and carrying the £1000 to the reserve fund, the net profit was about £7450 more than it was in the corresponding half of 1901.

The Deputy-Chairman (Mr. T. Rigby) seconded the motion.

The Chairman, replying to Mr. A. W. Oke, stated that since the beginning of the current half year they had experienced a larger increase in the consumption of gas than in the corresponding weeks of last year. Their Engineer had reported that the increase during the

previous fortnight was 9·3 per cent.; so that he (the Chairman) thought they would have a much higher average increase to report at the end of the current half year than for the past one. Of course, this had arisen from their not having had a very bright summer, and through the temperature having been much lower than at this time last year.

The motion was unanimously carried.

Mr. CORBET WOODALL moved the declaration of dividends at the rate of 14 per cent. per annum on the "A" stock, 11 per cent. on the "B" stock, and 9 per cent. on the "C" stock and Carshalton shares. He said he proposed the resolution with great confidence and satisfaction. They had been declaring dividends for the last two half years which, he believed, they had not earned. This was not the case that day. They had earned the dividends, and were doing something to make good those depletions which had caused a little alarm to some proprietors. He might perhaps mention that the amount the Company had to pay in extra cost for materials during the recent high prices was £25,000. They met this by taking £15,000 out of their own reserves; and, by adding 2d. to the price of gas, they took £10,000 from the consumers. He thought this was a very fair division between the two. It might be said, and rightly so, that the Company did not themselves suffer in any way by the sacrifice of the £15,000, inasmuch as they maintained their dividends, whereas the consumers had to pay £10,000 in additional charge for gas. But, at any rate, it did require a certain amount of courage to take off the extra price from the gas so soon as they did; and, furthermore, the Directors did claim that it needed some courage to put only 2d. on the price of gas when so many companies round about them were adding 6d., 7d., and some even more. There was one remarkable thing in the accounts submitted. It was this, that, while they had saved £13,600 in the cost of the materials used for gas making, they had only lost £1600 in the revenue for residuals. He was not quite sure, but he believed this was a unique experience in gas accounts for the past half year—that, while the price of raw materials had fallen so very much, they had been able to keep up the price of their residuals so well. The dividends the Company had declared and were declaring were high ones there was no doubt; but it must be a satisfaction to the shareholders and also to the consumers to know that the charge against the gas in Croydon for dividend, measured as an amount per 1000 cubic feet of gas sold, was a low one. This was due to the fact that the capital of the Company was low; and he was sure the policy of the Directors for many years past in keeping down the amount of capital had been the basis of the great prosperity of the Company.

Mr. WILLIAM CASH seconded the motion, which was agreed to.

The Chairman and Directors were cordially thanked for their services, on the motion of Mr. C. E. BOTLEY; and a similar compliment was also paid to the officers and their respective staffs. To the latter the Engineer and General Manager (Mr. J. W. Helps) and the Secretary (Mr. Topley) made suitable responses.

TOTTENHAM AND EDMONTON GAS COMPANY.

The Annual General Meeting of this Company was held last Saturday, at the Offices, High Road, Tottenham—Mr. CORBET WOODALL in the chair.

The SECRETARY (Mr. James Randall) read the notice calling the meeting; and, after the disposal of the formal business, it was agreed to take as read the report and accounts, as noticed last week.

The CHAIRMAN said it was his pleasure to move that the report and accounts be received and adopted; and he did this with very great satisfaction—as great as he had ever felt when addressing the proprietors. Compared with the same period of last year, they had sold 25 million cubic feet more gas; and, although the quantity had increased to this extent, the cost of manufacturing, excluding wear and tear, had been reduced by some £6000. The price charged for gas during the half year had been 4d. per 1000 cubic feet less than in the corresponding period of last year, which meant a loss of revenue to the Company of about £5500, and naturally a saving to the consumers to a like extent. At the same time, the profit earned was practically identical. A few figures would be of interest in illustration of the position. The chief savings had been in coal and oil, £8300; wages and purification, notwithstanding the increased quantity of gas, had cost them £500 less; and bad debts had been reduced by £250. In addition to these savings, they had a gain of £780 in meter and stove rental. Altogether, the advantages on the half year amounted to £9800. On the other hand, the net loss on gas-rental had been £970; and the loss on residual products—chiefly coke—was £2000. Then they had spent more on repairs and renewals by £4400; and they had paid extra in rates to the extent of £500. There had also been additional expenses, chiefly due to the increase in business, amounting to £2000. Therefore the net result was that they had saved £9800, and had spent or lost in revenue £9870. This being so, as far as profit went, they stood almost the same as they did at this time last year. The price of coal had now returned to what might be regarded as nearly the normal rate; and the same might be said of oil. The rates they had paid since June, 1899, for coal had varied as follows, taking the half years; 14s., 15s. 8d., 17s. 8d., 22s. 6d., 21s. 11d., 18s. 2d., 16s. 8d., and, in the current half year, he estimated the cost would be, as nearly as possible, 15s. 8d. In the case of oil, the variations had followed almost the same lines in the same half years. The prices, per gallon, were: 3d., 3d., 3d., 4·47d., 4½d., 3·35d., 3d., and, in the current half year, the cost would be about 2½d. It might therefore be reasonably assumed that, with a still rapidly growing business, the profits would increase, and (he thought he could safely promise) that not only would the present rates of dividend be retained, but, in the near future, the Directors would have the great satisfaction of announcing a further reduction in the price of gas. Probably the most interesting figure in the accounts—certainly the one which seemed to him to call for explanation—was the large increase in the amounts spent upon repairs and maintenance of works and mains. The two items totalled to £13,300 for the half year, and were, as he had already said, £4400 in excess of the corresponding half of last year. This £4400 represented about 3d. per 1000 cubic feet on the price of gas. He would at once say that this was not due to the making up of any arrears owing to neglect in the past. At any rate, as long as he had known the works, they had been maintained in a full state of efficiency. But with an undertaking growing at the rate of theirs, and this applied also to other concerns similarly prosperous, there came times when the ordinary renewals had to be supplemented by more considerable re-arrangements and modifications of plant and connections. Such a time had come to them. A visit to the works would be very interesting just now (although they were not in their usual apple-pie order) to anyone who took a practical interest in gas making. The extensions now being made were, to a large extent, replacements of existing works. For instance, they were at present renewing the connections practically throughout the works, excepting such as had been put in in comparatively late years. But in taking these out, and putting in new ones, there was a considerable amount of waste; and labour was, of course, very heavy. It was upon the manner in which these periodical large modifications and renewals were dealt with that the future prosperity of the Company (and others) very largely depended. The border line between capital and revenue was not very sharply defined; and under some circumstances—such as those he was now referring to—it was not easy to read that line very definitely. They were at present putting in new plant to a very large extent. Now, if new plant was charged to capital, while no debit was made against revenue for the old plant displaced, it was only at the moment that a larger balance of profit would be shown; but the undertaking would be permanently burdened with an amount of unproductive capital, upon which dividends would have to be earned. He made these observations for this reason—that, had the expenditure on repairs and renewals been normal in the past half year, the Directors would have been in a position to reduce the price of gas and pay a larger dividend. They did desire to lower the price of gas as quickly and as far as possible. It was not only their duty to do so, but it was the true policy and interest of the Company. A low price of gas, as of most commodities, stimulated demand, and opened up new applications; while a higher charge discouraged enterprise, except in the direction of providing substitutes. Next, however, to a high price, a fluctuating one was most objectionable; and they must see to it that each step they took in reduction was justified by the position of the Company, and that they were not likely to need to retrace it. This they were doing; and the large expenditure shown in the accounts, which would be continued in the current half year, would help largely to maintain the prosperity of the Company, and to cheapen the cost of gas making. The relative cost of making coal gas and water gas had been 20·99d. and 17·04d. per 1000 cubic feet respectively—the coal gas having an illuminating value of 13 candles, and the carburetted water gas of 19 candles. The additional costs for renewals had been charged equally to both gases; but deducting these, the costs would be 18d. and 15d. respectively. The report intimated that the business in stoves and fittings was growing rapidly. At the present time, they were sending out about fifty stoves per week; and the increase during the past year had been within two or three of 500. Partly because of this, they had purchased the adjoining premises called "The Ferns"; and they would very shortly concentrate on that property the whole of the outdoor work of the Company. It would be to their interest to erect shops there—not only for storing stoves, but also for the repairing, cleaning, and issuing of them, as well as for dealing with the indoor fittings of houses. He was glad to say that the advantage the Directors anticipated from removing the offices to the present site had been fully realized; and the economy of the change was being made more manifest from day to day. The report referred to the issue during the half year of £40,000 of "B" stock; and he thought the price at which it was sold, especially comparing it with the price of gas stocks generally at the time, spoke loudly for the confidence the proprietors felt in the future of the Company. At the same time, he should like to say that the success which attended the sale of the stock was due very largely indeed to the energy displayed by their Secretary. He (the Chairman) was bound to say Mr. Randall gave to all his work an amount of attention which was very gratifying and very helpful; but he took this matter of the issue of the stock in hand with a vigour and enthusiasm which helped very much the favourable result that was obtained. He did not think there was anything else in the accounts to which he need call attention. The Directors were very well pleased with the present position of affairs. It was quite true the dividend they were proposing to declare had not, according to the showing of the accounts, been quite earned in the half year; but he had no fear as to the current half year yielding the full amount of the dividend that he hoped they would declare at the next meeting, and that they would begin again to build up to some extent the reserve fund.

Mr. JAMES WARREN seconded the motion, which was unanimously adopted.

Mr. HENRY BAILEY moved, and Mr. G. T. WATSON seconded, the declaration of dividends at the rate of 6 per cent. on the "A" stock, and 4½ per cent. on the "B" stock. Both speakers referred to the fact that the dividend had been increased on this occasion.

The proposition having been agreed to,

The retiring Directors (Mr. G. T. Watson and Mr. H. Bailey) and the Auditor (Mr. J. L. Chapman) were unanimously elected.

Mr. CHAPMAN, in the course of his reply, remarked that he felt the amount of money that was being spent out of revenue on the works was a great source of strength to the Company; and everything that the Chairman had said in connection with this subject, he could entirely endorse. Continuing, he proposed a vote of thanks to the Chairman and Directors. He said he could remember when the shareholders used to hold their meetings in a little room on the works; then they went across the road into the offices built in Willoughby Lane; and now they were meeting in the new palatial offices in the heart of Tottenham. These changes were marks in the wonderful increase in

the prosperity of the Company. For what the Directors had done to bring this about, the proprietors owed them their thanks.

The motion, which was seconded by Mr. GOULD, was very cordially agreed to.

The CHAIRMAN acknowledged the obligation of the Directors to the proprietors, and then moved a vote of thanks to the chief officers and their respective staffs. Again he referred to the devoted labours of Mr. Randall; and, concerning the Engineer, he said that the Directors were also able, after the lapse of some years, to speak highly of Mr. Broadberry. He (the Chairman) believed the works would, from half year to half year, bear increasing testimony to the capability of Mr. Broadberry, and to his determination to make the technical side of the undertaking worthy of comparison with the best.

The proprietors gave their hearty concurrence to the motion.

Both Mr. RANDALL and Mr. BROADBERRY responded—the former making the interesting statement that the list of shareholders had been increased by something like 150 in about eighteen months, which proved that Tottenham and the Gas Company were getting better known.

SHEFFIELD UNITED GASLIGHT COMPANY.

The Half-Yearly Report and Accounts.

At the Meeting of this Company on the 9th prox., the Directors will remind the shareholders that, owing to the very high price paid for coal, the profit on the working for the half year to June 30, 1901, fell short by £15,639 of the amount required to pay the dividend, and that this sum had to be taken from the balances previously carried forward. They have now the pleasure to submit a much more satisfactory report, inasmuch as, in place of the deficiency above referred to, the working for the past six months has resulted in a surplus (after providing for the dividend) of £1727, though the price of gas was 2d. per 1000 cubic feet less than in the corresponding period, and gas used for engines was supplied at 1s. 8d. per 1000 cubic feet. The Company's charges are now from 2s. down to 1s. 8d. per 1000 cubic feet, according to consumption. The dividend will amount as follows: On the "A" stock, to £6750; on the "B" stock, to £10,499; and on the "C" stock, to £26,175; making together £43,424. The accounts accompanying the report show that the revenue from the sale of gas in the six months ended the 30th of June amounted to £125,423, the rental of meters and stoves produced £7128, and the sale of residuals £56,842—the total receipts being £191,398. The manufacture of gas cost £113,568; distribution, £14,724; rents, rates, and taxes, £11,600; and management, £5694—the total receipts being £146,845, leaving £44,553. The balance on the profit and loss account available for the payment of dividends is £62,861; and of it, as shown above, £43,424 will be absorbed. In the half year, 121,487 tons of coal and 14,154 tons of cannel were carbonized; the estimated quantities of residuals produced being: 83,006 tons of coke and breeze, 7670 tons of tar, and 4,015,000 gallons of ammoniacal liquor. A sum of £6991 was expended on capital account during the six months; £5709 being for new mains and service-pipes, and £2142 for new meters and stoves.

PROVINCIAL GAS AND WATER COMPANIES.

GAS COMPANIES.

Aldershot.

In the half year ending June 30, the Aldershot Gas and Water Company had a revenue of £16,140 from the gas undertaking, and of £4041 from the water undertaking—together, £20,181. The expenditure in connection with the former was £13,556, and with the latter £2483—together, £16,039. The balances were £2584 and £1557 respectively. The amount available for distribution was £9580; and at the meeting last Friday the Directors recommended dividends for the half year at the following rates per cent. per annum: £11 4s. on the "A" shares, £8 4s. on the "B" shares, and £7 on the ordinary "E" and "F" shares, all less income-tax. They remarked that, owing to the war, and the absence of a large number of troops from Aldershot during the greater part of the half year, the consumption of gas did not show the usual marked increase. However, with the conclusion of peace and the return of troops, together with a brighter aspect in the residuals market—particularly coke—there appeared to be good reason to anticipate the usual satisfactory progress in the Company's business. In support of this, they referred with satisfaction to the circumstance that substantial increases in the sales of gas had been recorded during the past few weeks.

Bridport.

At the meeting of the Bridport Gas Company to-day, the Directors will report that the profits on the working in the past year amounted, with the balance brought forward, to £1384, which enabled them to recommend the payment of a dividend of 8 per cent. on the ordinary shares, free of income-tax, and of 5 per cent. on the preference shares, less tax. These payments will absorb £1059, and leave £325 to be carried forward. There was an increase of 1,829,600 cubic feet in the quantity of gas sold last year, compared with the twelve months ending the 30th of June, 1901.

Bristol.

The revenue from the sale of gas by the Bristol Gas Company in the six months ending June 30 was £118,973; the rental of meters and stoves produced £4264; residuals yielded £40,693; and the total receipts were £164,099, compared with £167,143 in the corresponding period of 1901. The expenditure on the manufacture of gas was £107,509; on distribution, £7318; and on management, £5026—the total expenses being £129,184, against £158,501. The balance carried to the profit and loss account is £34,915; whereas for the first half of last year it was £8642 only. The balance available for distribution, after payment of interest on the debenture stock (£5273), is £29,642; and at the meeting on the 28th inst. the Directors will recommend the payment of the maximum dividend at the rate of 5 per cent. per annum, subject to deduction for income-tax. This will amount to £26,813, and leave £2829 to be carried forward. The increase in the consumption of gas is continuous and satisfactory; and the demand for cooking-stoves shows no sign of diminution. During the half year covered by the report, £19,057 was spent on capital account, bringing up the total outlay to £1,145,535.

Maidstone.

The annual general meeting of the Maidstone Gas Company was held last Thursday—Mr. George Marsham in the chair. The accounts presented showed receipts amounting to £52,298, and expenses equal to £42,726; leaving £9572 to be carried to the profit and loss account. The balance in favour of the Company was £13,759; and the Directors recommended the declaration of a dividend, less income-tax, of 10¼ per cent., of which 5¼ per cent. was paid in March. The Chairman, in moving the adoption of the report, commented on the satisfactory position of the Company; stating that they were fortunately in a position to pay a dividend of 10¼ per cent., compared with 9½ per cent. last year. They had, too, been able to reduce the price of gas, and they saw their way to a further reduction. He hoped the time had come when they would be able to fulfil what he had always felt had been a moral obligation upon them, and that was to extend their supply to the neighbouring parishes scheduled under their Act. It might be possible to even go further. This would, he thought, cause them to need more capital: and he hoped the shareholders would be prepared to leave the matter in the hands of the Directors. No business was satisfactory that stood still; and they must go on and progress—increasing their business in various ways. Concluding, he voiced the opinion of the Directors that the business of the Company was satisfactorily conducted by the officials. Mr. W. Bryant seconded the motion. He attributed the improved position of the Company to the new gasholder, which enabled the staff to work steadily and without the fits and starts previously necessary. The report was adopted; and the Directors were authorized to raise the additional capital.

Poole.

In the "JOURNAL" last Tuesday, we noticed the report and accounts of the Town and County of Poole Gas Company for the six months ending the 30th of June last, which were presented at the half-yearly general meeting on the previous day. It was then mentioned that this was the final set of accounts which would be issued, owing to the undertaking having been acquired by the Bournemouth Gas and Water Company; and, in view of this fact, the Chairman (Alderman H. Farmer), in the course of his address in moving the adoption of the report, gave a short history of the concern. He said it was commenced as a private Company, under a Deed of Settlement, in 1833—an early day in the history of gas lighting. The capital was £4000 (now it was £37,020), and frequently, he believed, no dividend was paid; the profits being absorbed in extensions of the plant. In the year 1875, the shareholders, not without reason, were dissatisfied with the management of the Company, and tried to make an alteration, but without much success. The Town Council determined to approach Parliament, asking for powers to construct works. This step was met by an application from the Company for a Provisional Order, which was granted and that of the Corporation refused; the Company getting much better terms than their most sanguine expectations led them to expect, the capital then being £20,120. Of the first Directors, two—one being himself and the other Mr. Gutch—were still on the Board. In conclusion, the Chairman said he had every reason to hope and believe that the shareholders might look forward to the result of the amalgamation with confidence and hope. The report was adopted, and the maximum dividends on the whole of the capital were declared. Mr. F. G. Wheatley, F.C.A. (the Auditor of the Company) was appointed Liquidator. A vote of thanks to the Chairman, Directors, and officers having been unanimously accorded, the Chairman, in reply, thanked the shareholders for the confidence reposed in them for so many years, and spoke in enthusiastic terms of the services of Mr. Davis (the Secretary and Manager) during the sixteen years he had been with the Company; also of Mr. Gutch's careful work as Clerk.

Rochester.

The Rochester, Chatham, and Strood Gas Company held their half-yearly meeting on the 7th inst., when the accounts presented showed a profit of £3791, out of which dividends at the rates of 10 and 7 per cent. per annum were declared.

Reading.

The accounts to be presented at the half-yearly general meeting of the Reading Gas Company to-day show that the revenue from the sale of gas in the six months ending June 30 was £29,117; residuals produced, £9434; and the total receipts were £39,351. The expenditure on the manufacture of gas was £27,324; in distribution, £2160; on management, £1514; and rates and taxes and other items made up a total of £33,276, leaving £6075 to go to the profit and loss account. The balance available for distribution was £20,139, which enabled the Directors to recommend the payment of full dividends for the half year. In their report, the Directors expressed great satisfaction in announcing that the Bill for consolidating the capital of the Company, to enable them to raise additional capital, and for other purposes, after being opposed by the Corporation of Reading before the House of Commons, was, with only slight modifications, passed by both Houses of Parliament, and received the Royal Assent on the 23rd of June. They have full confidence that the new Act will prove conducive alike to the prosperity of the Company and the good of the community. The growth in the business having rendered it requisite to add to the plant, the Directors find it necessary to raise additional capital, and a considerable amount will be offered in the autumn. In view of the

great advantages of the incandescent system of gas lighting in regard both to illumination and to health, the Directors are doing all in their power to popularize it; and they now undertake the maintenance of incandescent burners at a small charge. The prepayment system is extending very rapidly in the Company's district. During the past half year, a large number of houses were fitted up; and about 800 additional applications for meters were received.

Scarborough.

The Directors of the Scarborough Gas Company reported a satisfactory increase of business at the half-yearly general meeting last Saturday. The total quantity of gas sold was 4·5 per cent. more than in the first six months of 1901; and there was a steady demand for prepayment meters, cooking-stoves, and gas-fires. The revenue amounted to £23,325, and the expenditure to £17,093; leaving £6142 to go to the profit and loss account. The net revenue, including £825 brought forward, and after deducting interest charges, was £6023. After providing for the dividend on the preference stock, the Directors recommended the declaration of the usual dividends on the ordinary stocks (less income-tax). The payment of these required the sum of £6588, and necessitated the transfer of £565 from the reserve fund. This small deficiency was fully anticipated by the Directors, and was due chiefly to the large increase in the price paid for coal.

Yeadon and Guiseley.

The half-yearly meeting of the Yeadon and Guiseley Gas Company was held last Wednesday, Mr. W. King (Chairman) presiding. The report showed the profits for the six months ended June 30 to have been £1365; and dividends of 10 and 7 per cent. per annum were recommended. This would leave a balance of £23 to be carried forward. The quantity of gas sold during the six months was 33,344,300 cubic feet—an increase of 1·79 per cent. upon the consumption for the corresponding period of last year.

WATER COMPANIES.

Chester.

The half-yearly meeting of the Chester Water-Works Company was held on Thursday—Mr. F. E. Roberts presiding. The report of the Directors for the six months ending June 30 stated that there was a surplus revenue over expenditure of £3115, which, with the balance brought forward, made a total of £11,047. The interest on preference shares required £450, leaving a balance of £10,597. It was recommended that the usual statutory dividends should be paid (free of income-tax), which would absorb £1890; leaving a balance of £8707. The Chairman, in moving the adoption of the report, commented upon the satisfactory condition of the Company, and remarked that the consumption of water was increasing about 20 million gallons a year. The motion was carried, and it was resolved that dividends, without deduction for income-tax, should be declared for the half year at the rate of 7½ per cent. per annum on the consolidated stock, 6 per cent. per annum on the perpetual 6 per cent. preference shares, of 7 per cent. per annum on the new ordinary stock (1874), and interest at the rate of 4 per cent. per annum on the amount of calls paid on the second moiety of the new stock.

Maidstone.

At the half-yearly general meeting of the Maidstone Water Company last Wednesday—Mr. H. Tyrwhitt Drake in the chair—the accounts presented showed a sum of £5287 to the credit of the profit and loss account; and the Directors recommended the payment of a dividend, free of income-tax, for the six months, at the rate £7 3s. 4d. per cent. per annum on the 10 per cent. shares, and of 5 per cent. per annum on the 7 per cent. shares. These payments would absorb £1603, and leave £3684 to be carried forward. The Directors considered that the time had arrived when steps should be taken to improve and extend the present water supply. After carefully going into the matter, they came to the unanimous conclusion that the following works should be carried out; (1) An extension of the Forstal pumping-house, with additional beam-engine and well pumps to raise water to a high-service reservoir from the borehole; (2) the construction of a high-service reservoir in the neighbourhood of Boxley or Detling, at an elevation of 350 to 400 feet; and (3) the laying of a 12-inch main from the Forstal pumping-station to the new reservoir, with distributing mains as required. By this scheme, a considerable saving in the cost of pumping would, they said, be effected. The storage capacity would be largely increased, the existing supply in the high districts improved, and the Company would be able practically to serve the whole of the area authorized by their Acts, a considerable portion of which it was now impossible to reach, owing to the insufficient elevation of the present reservoirs. The pumping plant would be duplicated, and a second line of main secured. The Directors asked the shareholders to approve of the scheme, so that they might be able to make such arrangements as they might think fit to carry it out. The report was adopted.

Wrexham.

The annual meeting of the Wrexham and East Denbighshire Water Company was held last Tuesday, when the Directors reported a balance of £6248 on the net revenue account, out of which they recommended the payment of dividends at the rate of 7 per cent. upon the consolidated stock, and of £4 18s. per cent. on the ordinary shares, free of income-tax. The Chairman (Mr. W. J. Sisson), in moving the adoption of the report, explained that the expenditure on capital account during the year had been £4388, of which £3050 had been for new works in connection with the sinking of boreholes at Talwrn. He then dealt in detail with the items in the accounts. The report was adopted, and the dividends recommended were declared. The Directors were empowered to convert the existing shares into ordinary stock, and to raise further capital, not exceeding in the whole £30,000, under the provisions of the Company's Order of 1898 and their Act of the present session. A vote of thanks was accorded to the Chairman, and also to the Secretary (Mr. F. Storr) and the staff, for their attention to the interests of the Company.

THE INSPECTION OF GAS LIQUOR AND OTHER WORKS UNDER THE ALKALI ACTS.

District Inspectors' Reports—Chief Inspector's Report for Scotland.

We continue to-day our notice (see *ante*, p. 407) of the report of the Chief Inspector under the Alkali, &c., Works Regulation Acts (Mr. R. Forbes Carpenter) for the past year, by giving some extracts from the reports of the District Inspectors, and from Mr. Carpenter's report to the Secretary for Scotland, by which they are followed.

As in previous years, the first district to be noticed is Ireland, which is under the supervision of Mr. E. G. Ballard. He reports that 23 sulphate of ammonia and 6 tar works were registered in the district during 1901, and that 63 separate processes came under inspection. The number of visits paid was 127; and the number of tests of exit gas made was 100. The works in the district were all carefully conducted, and, with one exception, no trouble arose in connection with the administration of the Acts at any of the places where scheduled operations were carried on. Taking all the places where sulphate of ammonia is made in Ireland, the number of works absorbing the sulphuretted hydrogen in oxide of iron is 21; the number burning it, 4; the number working on the continuous system of distillation, 16; and those working on the intermittent system, 9. The last named system continues to give way to the continuous still, as in former years; the proportion of liquor distilled by the continuous and intermittent systems being 91·99 and 8 01 per cent. respectively. The proportion of sulphuretted hydrogen treated by various methods, in terms of sulphate made and per cent. of the total make, is as follows: Oxide purification, 81·39; retained by lime, 1·03; by combustion, 4·23; and by metallic salts, 13·34. Products equivalent to 2435 tons of sulphate of ammonia were made in the district during the past year. Mr. Ballard has no changes to report with regard to works for the distillation of tar.

In the North of England—the district under the supervision of Mr. I. W. Young—46 sulphate of ammonia and 7 tar works were registered last year; the number of processes under inspection being 172. Of the 663 visits paid and 568 tests made, 254 and 11 were in connection with tar and sulphate works. The total output of sulphate in the district was 14,030 tons—an increase of 15·9 per cent. over the production in the year 1900. The greater portion of the liquor was distilled on the continuous system at 43 works; the remainder in intermittent distillation plants. The proportion of liquor distilled on the former system was 98 per cent. Two works have substituted continuous for intermittent stills since last year, but one had not come into use when the report was made. In the majority of cases, the foul gases evolved from the saturators were destroyed by oxide of iron purifiers. Three additional tar distilling works were registered last year. At one works in the district, a fatality occurred, owing presumably to poisoning by sulphuretted hydrogen—a small quantity of ammoniacal liquor having been run into an open vessel containing sulphuric acid. The originator of the calamity had had upwards of twenty years' experience in the handling of tar distillation products.

In addition to Ireland, Mr. Ballard has under his supervision Cheshire, North Wales, and part of Lancashire, in which there are 3 gas liquor, 21 sulphate of ammonia, and 5 tar works registered. The number of separate processes which came under inspection last year was 128, against 131 in 1900. There was a falling off, both in the number of works registered and also in the separate operations carried on, during the year. The works in the district were, on the whole, in good order, and every facility was afforded by manufacturers to enable the Inspector to execute his duties with as little delay as possible—giving him all necessary information regarding the operations carried on, which was likely in any way to bear upon his work, and the administration of the Acts. The gas liquor and sulphate of ammonia works were all carefully conducted. In the latter, plant on the continuous system is employed in 191 and on the intermittent system in 4; the proportion of liquor distilled by the former being 98·98 per cent., and by the latter 1·02 per cent.

In the district comprising Widnes and Runcorn, which is under the supervision of Dr. J. Affleck, the five works for the treatment of sulphate and muriate of ammonia were carried on last year on much the same scale as before. All the apparatus was maintained in an efficient condition; and no cause was given for complaint in respect of sulphuretted hydrogen or other noxious gases evolved.

The district under the supervision of Mr. Herbert Porter comprises North and East Lancashire and part of Yorkshire, in which 12 liquor and 40 sulphate of ammonia works were registered last year; the total quantity of liquor distilled being equivalent to 18,224 tons of sulphate of ammonia. The sulphuretted hydrogen evolved during the process of manufacture was dealt with by absorption by lime or oxide of iron (mostly the latter) to the extent of 58·17 per cent. of the liquor distilled. One new works for the manufacture of sulphate of ammonia was registered during the year, and the waste gases are taken to an oxide purifier. One of the already registered works has, since the last report, adopted the Claus process for dealing with the sulphuretted hydrogen. Mr. Porter says this method finds favour with gas managers as being one cleaner and accompanied by saving of labour, as compared with purifiers, which need frequent changing. At two works, as mentioned in former reports, air is used to revivify the oxide of iron while the purifiers are at work. In both cases it is forced into the gases passing to the purifier—in one by means of an air-pump, and in the other by a steam-injector. Mr. Porter points out that care is necessary in conducting the operation, for if the air is allowed to be admitted for too long a period the purifiers will fire The general operations at the tar-works were satisfactory last year, and the condition of the plant was good.

In the East Midland district, over which Mr. E. Morley Fletcher has supervision, the total quantity of gas liquor treated last year was equal to 17,637 tons of sulphate of ammonia; the proportion distilled to liquor ammonia being 38·94 per cent. The number of works using

continuous processes was 301, and intermittent processes, 6; this proportion of sulphate and muriate of ammonia made by the former being 95·97 per cent. One sulphate of ammonia works was added to the register, and one deriving its ammonia from coke-ovens stopped working, the coal not proving very suitable in the oven. The sulphuretted hydrogen evolved in the manufacture of sulphate of ammonia is absorbed in oxide of iron, except when it is converted into vitriol; and in one works a Claus kiln is in use. Experiments have, however, been carried on at one place with a method of wet purification by means of absorption in ferric sulphate and subsequent oxidation of the ferrous sulphate. This latter process has proved a difficulty, and the method is not at present a success. The total amount of ammoniacal compounds manufactured during the year was 14,617 tons, calculated as sulphate of ammonia.

Mr. E. Jackson always has something interesting to say about the South Midland district, in which 156 works were registered last year; the separate processes under inspection numbering 211, of which 8 related to gas liquor, 78 to sulphate of ammonia, and 22 to tar works. There were 82 works registered (one less than in 1900) for the manufacture of ammonia products—sulphate, muriate, or carbonate—and the concentration of gas liquor. At five works, formerly registered, the manufacture of sulphate was discontinued this year; but as other registered processes are carried on at several of these works, they are not all off the register. Four new sulphate plants were erected in the district last year. At one works, registered for another process, large plant was put up for the recovery of ammonia in connection with a Mond gas plant. This was the first of the kind erected in the Midlands. The fourth new sulphate plant was put up at one works in the district last year. It comprised a continuous still, closed saturator, supplied with a Wilton elevator, water-cooled tubular condenser, and clinker scrubber. The "devil" liquor is returned direct to the still. The sulphuretted hydrogen is converted into sulphur dioxide in a specially designed furnace. The acid gases are then passed into a series of brick towers, and partially arrested by the spent lime liquor from the still; the remaining sulphur dioxide being passed into limestone and water towers. As the plant was only put into operation at the close of the year, Mr. Jackson has to postpone until next year any report as to the efficiency of the arrangements adopted; but he says "the constructors of the plant have kept in mind the principles involved, and appear to have provided, as far as experience has yet dictated, for a successful result. The utilization of the spent alkaline liquor in this way, for arresting the acid, and consequent neutralization of the liquor, may perhaps with advantage be recommended at certain works as the most desirable method, when success has been thoroughly established. However, the sulphur is lost by this process; and the principle may therefore be considered as less scientific at this point than where it is recovered from the waste gases and ultimately utilized to supply a portion of the sulphur required for the sulphuric acid used in the manufacture of sulphate of ammonia. But if it can be shown, with a more lengthened experience with this method of dealing with the noxious gases in more recently erected plants, that less nuisance is liable to arise from it than by some of the other methods now in use, then its more extended adoption will probably take place at the expense of the sulphur loss referred to. In large works without sulphuric acid plants, where there is no opportunity of utilizing the sulphuretted hydrogen in the burners, and also where the Claus process is not in use, the arrest of large quantities of sulphuretted hydrogen by means of oxide of iron involves both trouble and expense, especially when the oxide is almost spent—such frequent changing being then necessary." He adds that for the average gas-works sulphate plant, the oxide purifier works admirably, and is generally in use in his district—64 works employing this system of dealing with the noxious gases. The neutralization of sulphurous acid from the combustion of sulphuretted hydrogen from ammoniacal liquor by means of a tower packed with limestone down which water flows has been carried out for many years in one of the largest works in the district. Neither combustion of the sulphuretted hydrogen for vitriol manufacture nor the Claus process was applicable; while arrest by oxide of iron, owing to special conditions, was also unsuccessful. The limestone tower has, however, worked extremely well. The average acidity for the year of the gases passing away was 0·25 grain of sulphur trioxide per cubic foot. Mr. Jackson says the skilled scientific supervision obtaining at these works doubtless contributes largely to this successful result. During the year, a large plant for the recovery of products from blast-furnace gases was in course of erection; and it was almost complete when the report was written. As the works had not been registered, no description could be given of them. This is the second plant of this character in the district, and in England. At one works where there is a considerable production of sulphate of ammonia, oxide of iron purifiers were employed to arrest the sulphuretted hydrogen; but the Claus plant was put in last year, and completed at the end of September. It works very well. Mr. Jackson considers that the one weak spot in the Claus plants erected at sulphate works is the hot end of the sulphur chambers. This has been repeatedly pointed out, but he again puts it on record. The contraction and expansion of the brickwork necessarily causes cracking in time, and so the end has to be frequently rebuilt to be kept tight and prevent nuisance arising. With this exception, he says it is operated admirably in all the works using this method in the district. The total quantity of liquor distilled in the district last year, expressed as sulphate, was 27,815 tons. The number of works using the continuous method was 72, and the intermittent method 11; the proportion of liquor treated by the former being 97·3 per cent., and by the latter 2·7 per cent. With regard to the distillation of tar, the plants generally were all kept in good order, and were fully employed last year. There was no extension of still power except at one works, where an additional still was put in.

In the South-West of England and South Wales, there were 164 registered works in operation last year under the supervision of Dr. A. C. Fryer, and the number of processes under inspection was 203, of which 67 related to the production of sulphate and muriate of ammonia and 11 to the distillation of tar. The total quantity of ammoniacal compounds produced amounted to 9499 tons, calculated as sulphate of ammonia. The intermittent system of distillation had been abandoned in two works, and continuous stills, with good condensers and larger purifiers, were erected. The number of works using continuous distillation was 34, and intermittent distillation 29; the proportion of liquor treated by the former being 86·5 per cent.

In the East and South-East of England, Mr. F. Napier Sutton has 3 gas liquor, 65 sulphate of ammonia, and 9 tar works to supervise; the total number of registered works being 195, and the processes carried on therein 263. The total quantity of ammoniacal compounds manufactured in the past year amounted to 45,507 tons, calculated in terms of sulphate of ammonia—a decrease of 18 tons on the quantity made in the previous year. The ammoniacal products made consisted chiefly of sulphate; but considerable quantities of carbonate and nitrate of ammonia, liquid (refined), and anhydrous ammonia were also manufactured. All were derived from the distillation of gas liquor obtained in the carbonization of coal, with the exception of a small amount obtained from the manufacture of animal charcoal. Mr. Sutton says plant for the continuous distillation of gas liquor is now almost universally employed, and 98·5 per cent. of the liquor treated was thus distilled—only nine intermittent stills remaining in use in the district. The gas companies produced 83 per cent. of the ammoniacal compounds, and the balance was made by private firms. Very little alteration occurred in the proportion of gas treated by the various methods; but what there was was in the right direction. Treatment of the foul saturator gases by oxide purification was most general, and was in use at 45 works; but as the scale of manufacture at most of these was small, the proportion of gas thus treated only amounted to 6·7 per cent. of the whole. Mr. Sutton again urges the importance of having automatic hydraulic valves for purifier regulation, as another fatal accident has unfortunately to be recorded in connection with screw-valves. This occurred in works where the change-valves were situated in a brick pit some 4 feet deep, immediately next to the purifier wall. The pit was covered by an open grating, and a long key was used to turn the valves. One of these became fixed, and the man had to descend into the pit to remedy the matter, when he was overcome by foul gas which had accumulated there—probably by diffusion through a small crack in the purifier wall. Had properly constructed hydraulic valves been in use, this life would not have been sacrificed. Further advance was made last year in the method of disposing of the saturator gases by combustion, and subsequent neutralization of the acid gas produced. The neutralizing plant which had done excellent work for three years in one establishment in this district was destroyed by fire, together with the entire sulphate plant, early in the year. The whole has been rebuilt, and includes a vertical sulphuretted hydrogen furnace and a washer-condenser. Mr. Sutton gives a table of the results obtained at two works, showing that this appliance removes from 60 to 70 per cent. of acid from the furnace gases, and that the average neutralization effected amounts to upwards of 90 per cent., and occasionally to 96 per cent. and more. One complaint of alleged nuisance arising from the manufacture of sulphate of ammonia in this district was received during the year; but careful inquiry showed that it had no foundation in fact. The distillation of tar was carried on in 17 works; the number of stills employed remaining as before.

We now come to the Chief Inspector's report to the Secretary for Scotland (Lord Balfour of Burleigh), which, as usual, includes one by the District Inspector, Mr. W. S. Curphey. The number of works registered on Dec. 31, 1901, was 125, against 127 on the corresponding date in 1900; and the processes under inspection were 203 last year, compared with 208 before. There were 469 visits paid; and 325 examinations were made of the effluent gases. The general average escape of acid gases from all the sulphuric acid works was equivalent to 1·59 grains of sulphuric anhydride per cubic foot of total escaping gases. The total quantity of salts of ammonia made, expressed as sulphate, was as follows: Gas liquor works, 16,122 tons; iron-works, 16,003 tons; shale-works, 40,011 tons; and producer gas, coke, and carbonizing works, 2926 tons—total, 75,062 tons, against 72,123 tons in 1900. The bulk of pitch produced was 130,936 tons, against 131,322 tons. The number of works in which sulphate, chloride, or hydrate of ammonia was made was 67—the same as in 1900. They comprised 15 iron-works, 15 shale-works, five producer gas, coke, or carbonizing works, and 32 gas-liquor works. In iron-works, the ammoniacal liquor produced is practically free from sulphides; and the gases given off during the manufacture of sulphate of ammonia are correspondingly free from sulphuretted hydrogen. In shale-works, the waste steam and gases from the sulphate of ammonia plant are utilized in all the works for assisting in the extraction of ammonia during the destructive distillation of the shale after the crude oil has been driven off. At this stage of the process, large quantities of steam are required. In coke, producer gas, or carbonizing works, burning of the waste gases, purification by chemical means, and oxide of iron purifiers are used. In one of these works, the waste steam and gases from the sulphate manufacture, and containing but little sulphuretted hydrogen, are returned to the crude gases coming from the coking-ovens, and pass along with these through the process for the extraction of the tar and ammonia. Any uncondensed gases pass away with the permanent gases which are used for fuel, where the total acidity of the escaping gases after combustion, as ascertained by a series of tests over a long period, is raised by about 0·25 grain of sulphur trioxide per cubic foot when the sulphate of ammonia plant is at work. The means for dealing with the noxious gases produced in works using gas liquor were, as in former years, chiefly oxide of iron purifiers, burning, and removal of sulphides from the gas liquor by chemical means. In one works, the Claus process, modified to suit the characteristics of ammoniacal liquor obtained in Scottish gas-works, was put into successful operation. This modification was due to the Chief Inspector, who has had the results obtained under his direct observation. Of the 32 works in which gas liquor was distilled, 28 used the continuous and five the intermittent form of still. In one instance both systems were employed. Of the four methods of dealing with the noxious gases, 26 works used oxide of iron purifiers, and dealt with 57·1 per cent. of the gases liberated in all the works; and four adopted burning of the gases, and dealt with 31·5 per cent. of those liberated in all the works. In two of these, some of the gases were dealt with in

oxide of iron purifiers. Four works used chemical means for removing sulphides from the gas liquor, and dealt with 6·9 per cent. of the noxious gases. In one works the modified Claus process was used, and 4·5 per cent. of the noxious gases liberated in all the works were dealt with. The number of works in which tar was distilled was 42; being three less than in 1900, owing to the stoppage of three small works. In one iron-works the permanent gases from the tar-stills were returned to the blast-furnace gases before these were treated for the recovery of tar and ammonia, instead of being added to the purified gas about to be burned as fuel. In this way, the escape of sulphur compounds into the atmosphere was avoided. In a carbonizing works the residual gases from the tar-stills were returned to the coke-oven gases prior to their treatment for the recovery of tar and ammonia, instead of being purified by lime as formerly.

The Chief Inspector expresses his gratification at being able to record the fact that the supervision of the various chemical operations described by Mr. Curphey had been effected without the need of resort to prosecution of the conductors of any works for infringement of any of the penal clauses of the Act of 1881. He refers again to the Bill introduced to amend the Act of 1881, and makes the following remarks on the subject of sulphate of ammonia manufacture in Scotland:—

More than one-third of the produce of sulphate of ammonia in the United Kingdom is contributed from Scotch industries—75,062 tons out of 217,213 tons—the shale industry alone contributing nearly one-fifth. A decided increase in this item is recorded this year [1901] as compared with 1900. The remodelling of retorting methods in some of the large but older works, while producing a temporary drop in production in 1900 compared with 1899, owing to the time occupied in reconstruction, has now begun to bear its expected and anticipated fruit in greater yield of ammonia per ton of shale retorted. In the amount of ammonia recovered from blast-furnace gases there is again a slight reduction, due in great measure to some of the disturbing causes to which attention was directed in 1899. Moreover, somewhat fewer furnaces have been in average operation. During 1902, it is anticipated that the last blast-furnaces not hitherto fitted with ammonia-recovery apparatus will be connected up to plant now in course of erection. . . . The amount derived from gas-works for the first time takes the place of second contributor in order of magnitude. Water gas has not been received into such favour by Scotch gas engineers as south of the Tweed, where the amount of sulphate produced in gas-works shows an absolute reduction over the figures for 1900, notwithstanding increase of output of gas sold, and various improvements in gas scrubbers, washers, and condensers, all tending to improve the yield of ammonia per ton of coal carbonized.

Mr. Carpenter passes on to refer to the starting of the new residuals works of the Edinburgh and Leith Gas Commissioners at Granton, which was, he says, the feature of greatest interest in the year. The plant contains a modification of the Claus process, in regard to which some particulars from the report will be found in another part of the "JOURNAL." He next alludes to the fact mentioned by him in his report for 1900, that up to that time Scotland had not taken its due share in the development, in the blast-furnace industry, of the direct utilization of blast-furnace gases for the production of power by means of gas-engines of large dimensions, and says he understands that this reproach may shortly be removed. Ironmasters have not kept their eyes closed to the possibilities underlying such developments; but they have not been satisfied hitherto that the best type of gas-engine had been evolved, or, if evolved, that it was not still somewhat in the experimental and incomplete stage. Mr. Carpenter adds:

The most recent contribution by a recognized authority on the subject was that of [the late] Mr. Bryan Donkin, in a paper on "Motive Power from Blast-Furnace Gases," read before the Institution of Civil Engineers in December, 1901.* Mr. Donkin more than confirmed the experience of Professor Meyer, of Göttingen, quoted by me (37th Report, p. 143), when the latter stated that for 3 cubic metres (105·95 cubic feet) of blast-furnace gases used in a gas-engine for the production of one indicated horse power, 9 to 10 cubic metres would be required for raising steam supply for the best condensing steam-engine to produce the same power. Mr. Donkin's figures are 100 cubic feet and 400 cubic feet respectively. He adds that the excess of power so obtained from 100 tons of iron ore charged to the furnace would amount to 2000-horse power. The discussion on this paper brought to light many technical points of interest which have militated hitherto against the rapid application of the principles on which Mr. Donkin laid stress. As regards freedom from dust, whose presence is the usual drawback, Scotch blast-furnace gases, already scrubbed in the ammonia-recovery plant, should be eminently suitable, with the added advantage of increased calorific efficiency resulting from the scrubbing process.

With these remarks, the Chief Inspector brings his interesting report to a close.

GLASGOW CORPORATION GAS SUPPLY.

Annual Report of the Gas Committee.

The Gas Committee of the Glasgow Corporation have issued their report for the year ending May 31 last. In the course thereof, they state that the gross revenue amounted to £881,307, and the gross expenditure to £723,448, to which was added £32,043 depreciation off capital assets, making £755,491, and leaving £125,816 to be carried to the profit and loss account. The Committee had to meet the following requirements during the year: Annuities on stock, £34,762; interest on borrowed money and redeemed loans, £43,439; sinking fund, £8282—together, £86,483, leaving a surplus of £39,333 on the year's operations. The debit balance, as shown last year, amounted to £54,418; and the profits have met this to the extent of £39,333; leaving a balance of £15,085 to be carried forward to the debit of next year's account.

The Committee express their pleasure in stating that the market for residuals during the past year was more favourable, with consequent

* See "JOURNAL," Vol. LXXVIII., p. 1660.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 483.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 11	10½	Alliance & Dublin 10 p.c.	18½—19½	−½	5 7 8
100,000	10	,,	7½	Do. 7 p.c.	13—14	..	5 7 2
300,000	100	July 1	5	Australian 5 p.c. Deb.	100—102	..	4 18 0
200,000	5	May 14	6⅔	Bombay, Ltd.	6—6¼	..	5 0 0
40,000	5	,,	6⅔	Do. New, £4 paid	4¼—4⅝	..	5 9 5
380,000	Stk.	Aug. 14	12	Brentford Consolidated	250—255*	+1	4 14 1
270,000	,,	,,	9	Do. New	184—189*	−½	4 15 3
50,000	,,	,,	5	Do. 5 p.c. Pref.	125—130*	−½	3 16 11
206,250	,,	June 12	4	Do. 4 p.c. Deb.	111—114	..	3 10 2
220,000	Stk.	Mar. 13	10	Brighton & Hove Orig.	205—210	..	4 15 3
246,320	,,	,,	7	Do. A. Ord. Stk.	148—153	..	4 11 6
460,000	20	Apl. 11	10	British	39—41	..	4 17 7
50,000	10	Aug. 14	12	Bromley, Ord. 10 p.c.	52—24*	..	5 0 0
82,850	10	,,	9	Do. 7 p.c.	18—20*	+½	4 10 0
500,000	10	May 14	7	Buenos Ayres (New) Ltd.	10—11	..	6 7 3
250,000	Stk.	June 24	4	Do. 4 p.c. Deb.	94—96	..	4 3 4
150,000	20	July 11	8½	Cagliari, Ltd.	21—23	..	7 3 6
100,000	10	June 12	10	Cape Town & Dis., Ltd.	15—16	..	6 5 0
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	54—56	..	5 7 2
550,000	Stk.	Apl. 11	12½†	Commercial Old Stock	265—270	..	4 12 7
251,875	,,	,,	9½†	Do. New do.	205—210	..	4 10 6
271,875	,,	June 12	4½	Do. 4½ p.c. Deb.	130—134	..	3 7 2
800,000	Stk.	May 28	9	Continental Union, Ltd.	138—143	..	6 5 10
200,000	,,	,,	7	Do. 7 p.c. Pref.	147—152	..	4 12 1
575,000	Stk.	Feb. 27	5⅜†	Crystal Palace Ord. 5 p.c.	120—125	..	4 5 3
60,000	,,	,,	5	Do. 5 p.c. Pref.	122—127	..	3 18 9
106,158	,,	July 11	5	Do. 5 p.c. Deb. Stk.	139—142	..	3 10 5
486,090	10	July 30	10½	European, Ltd.	18—19	..	5 10 6
354,060	10	,,	10½	Do. £7 10s. paid	13½—14½	..	5 8 8
15,243,200	Stk.	Aug. 14	4	Gas-light and Coke	4 p.c. Ord.	88—91*	..	4 7 11
2,600,000	,,	,,	3½		3½ p.c. max.	88—90*	−¼	3 17 9
3,799,735	,,	,,	4		4 p.c. Con. Pref.	109—111*	..	3 12 1
4,193,975	,,	June 12	3		3 p.c. Con. Deb.	93—95	..	3 3 2
70,000	10	Nov. 13	8	Hongkong & China, Ltd.	13—14	..	5 14 4
3,800,000	Stk.	May 14	10	Imperial Continental		204—207	..	4 16 7
473,600	Stk.	Aug. 14	3½	Do. 3½ p.c. Deb. Red.		98—100*	−¼	3 10 0
561,000	Stk.	Feb. 27	10	Liverpool United A		220—222	..	4 10 0
718,100	,,	,,	7	Do. do. B		164—166	−1	4 4 4
306,083	,,	June 24	4	Do. do. Deb. Stk.		116—118	..	3 7 10
75,000	5	June 12	5	Malta & Medn., Ltd.		4¼—4⅜	..	5 5 3
560,000	100	Apl. 1	5	Met. of	5 p.c. Deb.	106—110	..	4 10 11
250,000	100	,,	4½	Melbourne	4½ p.c. Deb.	103—105	..	4 5 9
541,920	20	June 12	5½	Monte Video, Ltd.		9—10	..	7 0 0
1,515,892	Stk.	Aug. 8	4½	Newc'tle & G'tesh'd Con.		103—104*	..	4 6 7
346,855	Stk.	July 4	3½	Do. 3½ p.c. Deb.		98—100	..	3 10 0
150,000	5	May 28	8	Oriental, Ltd.		7—7⅛	..	5 6 8
135,000	4⅓	,,	8	Do.		6—6⅛	..	5 10 9
15,000	1	,,	8	Do.		1⅛—1⅜	..	4 11 5

* Ex div.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
60,000	5	Mar. 13	7	Ottoman, Ltd.	6⅛—6⅜	..	5 3 8
851,070	10	Apl. 25	7	River Plate Ord.	10—10½	..	6 13 4
300,000	Stk.	June 24	4	Do. 4 p.c. Deb.	93—96	..	4 3 4
250,000	10	Mar. 26	8	San Paulo, Ltd.	12—13	..	6 3 1
135,000	Stk.	Mar. 13	10	Sheffield A	239—241	..	4 3 0
209,984	,,	,,	10	Do. B	238—240	..	4 3 4
523,498	,,	,,	10	Do. C	237—239	..	4 3 8
6,000,000	Stk.	Aug. 14	5⅓	South Met., 4 p.c. Ord.	123—126*	+1½	4 4 7
1,700,000	,,	July 11	3	Do. 3 p.c. Deb.	92—94	..	3 3 10
380,940	Stk.	May 14	5	Southampton Ord.	102—106	..	4 14 4
87,950	,,	July 11	4	Do. 4 p.c. Deb.	102—105	+2	3 16 2
120,000	Stk.	Feb. 27	6†	Tottenham and Edmonton	A. 5 p.c.	120—125	..	4 16 0
300,520	,,	,,	4½†		B. 3½ p.c.	95—100	..	4 10 0
182,380	10	Jan. 16	5	Tuscan, Ltd.		7—8	..	6 5 0
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.		95—98	..	5 2 0
230,000	5	Aug. 14	9½	West Ham, 10 p.c.		10—11*	+¼	4 6 4
172,000	10	,,	6½	Do. 7 p.c.		13—14*	+½	4 12 10
				WATER COMPANIES.			
780,599	Stk.	June 24	11½	Chelsea, Ord.		300—310	..	3 14 2
150,000	,,	,,	5	Do. 5 p.c. Pref.		152—157	..	3 3 8
160,000	,,	,,	4½	Do. 4½ p.c. Pref. '75		140—143	..	3 2 11
175,785	,,	Mar. 26	4½	Do. 4½ p.c. Deb.		140—145	..	3 2 1
1,720,560	Stk.	Mar. 26	8	East London, Ord.		215—220	..	3 12 9
654,740	,,	June 12	4½	Do. 4½ p.c. Deb.		142—147	..	3 1 3
1,018,046	,,	,,	3	Do. 3 p.c. Deb.		96—98	..	3 1 3
700,000	50		8	Grand Junction	10 p.c. max.	112—117	..	3 8 5
310,000	Stk.	Mar. 26	4		4 p.c. Deb.	127—130	..	3 1 7
708,000	Stk.	Aug. 14	14	Kent		285—295*	+2	4 14 11
160,000	,,	,,	7	Do. New, 7 p.c. max.		195—205*	−1½	3 8 4
1,043,800	100	June 24	11	Lambeth, 10 p.c. max.		290—300	−5	3 13 4
406,200	100	,,	8½	Do. 7½ p.c. max.		210—220	..	3 13 4
350,000	Stk.	Mar. 26	4	Do. 4 p.c. Deb.		125—130	..	3 17 3
500,000	100	Aug. 14	12 5/16	New River, New Shares		390—400*	−3¼	3 1 7
1,000,000	Stk.	July 30	4	Do. 4 p.c. Deb.		125—130	..	3 4 0
902,300	Stk.	June 12	7	South-wark and	Ord.	192—197	+2	3 1 7
126,500	100	,,	7		7½ p.c. max.	180—185	..	3 11 1
489,200	Stk.	,,	5		5 p.c. Pref.	152—157	..	3 15 8
1,019,585	,,	Apl. 11	4	Vauxhall	4 p.c. A Deb.	125—130	..	3 3 8
1,155,066	Stk.	June 12	10	West Middlesex		275—285	..	3 1 7
200,000	,,	,,	4½	Do. 4½ p.c. Deb.		139—144	..	3 10 2
200,000	,,	Mar. 13	3	Do. 3 p.c. Deb.		96—98	..	3 2 6

* Ex div.

† Next dividend will be at this rate.

increase of income from this source, the average price received per ton of coal carbonized being 2s. 11·38d., compared with 2s. 8·46d. for the previous year—an increase of 2·92d. per ton. The quantity of coke sold was 277,430 tons, compared with 219,100 tons for the previous year; the average price received being 5s. 3·43d. per ton, against 8s. 10·55d. for 1900-1—a decrease of 3s. 7·12d. per ton. The Committee, as usual, advertised for tenders for coal to be supplied during the current twelve months, and they have concluded contracts for almost the whole quantity required, at prices under those of last year.

Notwithstanding that the balance of £15,085 will be carried forward to the debit of the profit and loss account, to be met out of the present year's revenue, that there will be increased expenditure in connection with the erection and equipment of the new Provan Gas-Works (which will be non-productive for some time), thus necessitating a larger sum to be provided for in respect of interest, and that sinking fund at the increased rate of 2¾ per cent. upon new borrowings will require to be set aside, in terms of the Glasgow Corporation (Tramways and General) Order, 1901, the Committee feel that they are justified in recommending that the price of gas should be reduced from 2s. 6d. to 2s. 4d. per 1000 cubic feet—this reduction to take effect retrospectively as from the date of the last survey. The Committee have also agreed to make the following recommendations with reference to the supply of gas for motive power: "(1) That it is expedient that the Corporation should supply the same at a price somewhat less than the price charged for gas supplied for private or lighting purposes, which they have power to do under the Gas Acts; (2) that from and after the date when the recommendations now made are approved of by the Corporation, and until otherwise determined, the price charged for gas for motive-power purposes be 4d. per 1000 cubic feet less than the price charged for gas supplied for lighting purposes; and (3) that a separate meter be used for all gas supplied for motive-power purposes."

The sinking fund, with its accumulations, now stands at £433,118.

The Committee again report that the works and mains were kept in a state of efficiency during the year. At the new works at Provan, satisfactory progress has been made. The buildings of the retort-houses, coal-store, exhauster-house, meter-house, workshops, and offices are practically completed, and the roofs are being slated. The contracts for the most important parts of the apparatus have been let. The purifiers and purifier-house are in a forward state. One gasholder tank is almost completed, and preparations are being made to commence the erection of the gasholder. The brickwork of the second tank is being pushed on. The branch lines connecting the high-level portion of the works with the Caledonian and North British Railways are almost completed. The laying of the trunk mains for connecting the new works with both the Dalmarnock and Dawsholm works is well advanced. Much yet remains to be done; but it is hoped that the works may be so far completed as to enable gas to be made by the autumn of next year. The new tar-distilling works at Dawsholm are in operation, and will be of considerable benefit both to the Corporation and to the lessees under the contract recently entered into.

About 22 miles of new mains were laid during the past year. The number of meters in use on May last, was 209,757; being an increase of 3193 on the number at the corresponding date in 1901. During the year, 20,500 metres were repaired, and 20,688 were examined while in use, of which 18,907 were found to be in a satisfactory condition, and 1781 defective. These were removed. The number of gas-stoves out on hire was 22,605; and the number of gas-heating and cooking appliances sold during the year was 1341.

On the 31st of July last, Royal Assent was given to the Glasgow Corporation (Gas, &c.) Order Confirmation Bill, 1902. By this Order, the Corporation are (*inter alia*) authorized to acquire the undertaking of the Milngavie Gaslight Company; and the entry of the Corporation upon that undertaking takes place on that day, when the price of £4000 agreed upon falls to be paid to the Company, with interest thereon at 5 per cent. per annum from that date till payment. The additional area of the gas supply of the Corporation under the Order includes not only the burgh of Milngavie, but also a considerable portion of the district immediately adjoining the burgh, and within this additional area the Corporation will be entitled to charge a differential rate for the gas supplied for private as well as public lighting purposes; but such rate is not at any time, unless otherwise duly authorized, to exceed the maximum price of 4s. 7d. per 1000 cubic feet, fixed by section 67 of the Glasgow Corporation Gas Act, 1869.

Turning to the accounts, the stock capital remains at £415,000, upon £300,000 of which annuities at the rate of 9 per cent. are payable; and upon £115,000, annuities at the rate of 6¾ per cent. The loan capital amounts to £2,327,000, but of this sum £286,935 of gas loans has been redeemed; and the sum also includes £980,231 borrowed for electric lighting purposes, of which £36,768 has been redeemed. The total amounts borrowed for gas purposes is £1,023,065, less the £286,935 liquidated. There was borrowed during the year (all from the Corporation of Glasgow) £195,000; and borrowing powers remain to the extent of £873,000, under the Order of 1901. The capital expenditure during the year amounted to £194,328. Of this sum, £209 was expended upon the Dawsholm works, £195 upon the Tradeston works, £4229 upon the Temple station and works, £137,942 upon the new Provan works, £13,885 upon chemical works at Dawsholm, £10 upon chemical works at Tradeston, £20,146 upon pipes and the cost of laying, £10,248 upon gas-meters, and £7465 upon gas-stoves. The capital account stands at £1,725,000. There has been expended upon the Dalmarnoch works £257,708; but sales of property and sums transferred amount to £15,599, and depreciation has been allowed to the amount of £176,103—leaving the capital value of the works at £66,005. Upon Dawsholm station the expenditure has been £561,896; but property realized and sums transferred (£19,009) and depreciation (£261,877), &c., reduce the account to £300,018. Upon the Tradeston station there has been expended £337,963; but property realized and sums transferred (£7168) and depreciation (£152,237) reduce the account to £185,726. Upon the Temple station there has been expended a sum of £233,573; but property realized (£6) and depreciation

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(£54,292) reduce the account to £178,630. Upon the new Provan works the expenditure has been £287,126, of which £137,943 was laid out during the past year. Upon pipes and the cost of laying the expenditure has been £656,446; but depreciation (£299,107) reduces the account to £357,339. Upon gas-meters the expenditure has been £429,178; but property realized (£279) and depreciation (£248,278) reduce the account to £180,901. Upon gas-stoves the expenditure has has been £87,128; but stoves sold (£17,022), depreciation (£24,323), &c., reduce the account to £41,345.

The gross revenue in the past year amounted to £881,307, which is by a long way the largest the department has ever had in one financial period; the next to it having been in 1900-1, when it amounted to £869,942. Going backwards from that year, the revenues were respectively £770,002, £700,149, £631,644, £607,622, and £605,794. The gross expenditure last year was £723,448, compared with £811,117 in the preceding period, and with expenditures in the previous years respectively of £644,281, £574,966, £526,355, £505,683, and £472,844. Of the gross revenue last year, £699,416 was derived from the sale of gas, compared with £673,346 in 1900-1. From the sale of coke there was realized £60,175, compared with £92,602; and from ammoniacal liquor and tar, £109,582, against £93,926. Of the expenditure, £435,819 was upon 703,568 tons of coal, at an average price of 12s. 4·666d. per ton, compared with £527,447 upon 678,200 tons in the preceding year, at an average price of 15s. 6·65d. per ton. A sum of £31,980 was spent upon purifying materials, and oil, water, and sundries, compared with £32,360; salaries amounted to £4551, as compared with £4361; wages to £87,272, against £85,932; and repairs and maintenance to £51,624, against £51,700. The total cost of the manufacture of gas was £618,646, compared with £709,450. The distribution of gas cost £60,276, against £60,908; the expenses on the stove account amounted to £5586, compared with £5082; rents, rates, and taxes were £26,313, against £24,893; management cost £10,890, against £9865; law and parliamentary charges amounted to £699, compared with £581; retiring allowances to £1037, compared with £338; and depreciation on works, pipes, meters, and stoves, to £32,042, against £31,306. The balance carried to the profit and loss account was £125,816, compared with £27,518.

HEREFORD CORPORATION GAS SUPPLY.

The Past Year's Working.

At the last Quarterly Meeting of the Hereford Town Council, the Gas Committee presented a report which included one by the Gas Engineer and Manager (Mr. W. Parlby) on the working of the undertaking in the financial year ending the 25th of March. It showed that the gross profits earned amounted to £6163; and after deducting the interest on loans, there was a net profit of £5190. From the net profit was deducted the item of £1116 for liabilities properly belonging to the previous year; and the balance was carried to the revenue account. At the commencement of the year, the number of ordinary consumers was 1538, and of penny-in-the-slot consumers 1174; at the close, the numbers were 1580 and 1500 respectively. The increase in the consumption of gas by the ordinary consumers was 5,437,600 cubic feet, and by the prepayment consumers 4,281,160 cubic feet. Last year the total quantity of gas consumed on the prepayment system was 15,167,800 cubic feet, which, divided among the 1500 consumers, represents an average of 10,112 cubic feet each—a figure closely approximating the estimate originally made in Mr. Parlby's report to the Council on the subject. Eliminating the liabilities properly belonging to the previous year, the total expenditure was £17,873; being £430 more than in the previous twelve months. The increase is practically accounted for by more coal being carbonized and more gas having been made, by extra expenditure incurred in converting a portion of the public lamps to the incandescent system, by repairs and renewals of retorts, by an increase in the cost of purification, and by additions under the head of salaries for prepayment collections. The total expenditure for gas-works purposes on March 25 amounted to £119,913, which includes £2644 spent during the year for penny-in-the-slot meters, mains, and service pipes. The total amount of loan indebtedness extinguished by means of the sinking fund up to March 25, was £80,668; leaving the loan liability as £34,881 at that date. Mr. Parlby points out that this large sum has been paid off within a period of 29 years out of the earnings of the undertaking; and he thinks the Town Council are to be congratulated on the possession of a property which has been able to bear so heavy a drain on its finances after paying all its working expenses and interest, seeing that other municipal undertakings are allowed 50 and 60 years in which to repay the principal borrowed. During the year, the total quantity of gas produced amounted to 123,095,600 cubic feet, including 121,348,000 from the coal carbonized and 1,747,600 estimated to be produced from the benzol. The quantity of gas made per ton worked out, on an average, to 11,658 cubic feet, or adding the benzol, to 11,826 cubic feet. The gas sold and accounted for was: Ordinary and penny-in-the-slot consumers, 88,435,700 cubic feet; public lamps, 13,608,300 cubic feet; contracts, 9,133,800 cubic feet; and works, 1,554,300 cubic feet—total, 112,732,100 cubic feet. This is an increase of 9,512,600 feet on the previous year. Leakage and condensation on the make was 8·41 per cent., against 6·82 per cent. for the previous year. This percentage Mr. Parlby hopes to see reduced as the new trunk main and the other enlargements of the distributing system are carried out. The report closed with a reference to the reduction to be made in the price of incandescent burners and mantles; and, in view thereof, and of the probable resulting extension of the system, Mr. Parlby expressed the opinion that the day would soon arrive when gas of considerably reduced illuminating power might be supplied, which would be sufficient for all purposes, while it would be much less costly to produce than that now generally sent out. The Mayor (Alderman J. R. Symonds), who is Chairman of the Gas Committee, in moving the adoption of the report, said it was a highly interesting document; and

A Great Triumph for Little's Patent Hot-Coke Carrier.—Mr. Hack, after inspecting Little's Patent Hot-Coke Carrier at Brighton, has placed the contracts for complete installations for No. 1 and No. 2 Retort-Houses at Saltley. Mr. Hack has had ten years' varied experience with the working of Coke Conveyors.

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he hoped the members would give it their careful consideration. He trusted that after this year they would be relieved of some of the heavy capital charges pressing upon them, and that they would find the gas-works an even more profitable and useful undertaking than they now were. The report was adopted.

ELECTRIC LIGHTING NOTES.

Sanguine Expectations.

At last Tuesday's meeting of the Louth Town Council, the Electric Lighting Committee presented a report stating that it would be to the advantage of the borough to establish electrical works for providing light and power, at a cost of £10,000, on land belonging to the Corporation. The Corporation pay the Gas Company about £720 a year for gas; and it is believed that an installation of electricity will result in a saving of about £200 per annum. The Committee were instructed to report further on the matter. We hope they will do this thoroughly; and then we may have a different story from them.

Failures of the Electric Light.

Under the extra strain of the Coronation illuminations, the Blackpool electricity supply failed on the 9th inst. About 9.20 p.m. the town was plunged into almost total darkness. Numbers of candles were employed; but the losses of the tradesmen who had arranged electrical illumination are said to be heavy. On the previous Thursday, Perth was suddenly thrown into darkness, owing, it is said, to a leakage of current. Great inconvenience was caused to pedestrians, and to those who had discarded the use of gas altogether for the new light. In the Police Office, candles had to be resorted to. This was the second occasion during the week on which there was a breakdown; there being a failure about the same time on Tuesday evening.

The South Shields Electric Light Undertaking.

The "Local Government Chronicle" has lately been criticizing the position of the municipal finances of South Shields, especially in regard to the electric light undertaking. The first point made is that the plant, though only five or six years in use, is already old-fashioned; and it is stated that if it and the mains had to be chosen to-day, much of them would be of a very different character. The most serious part of the indictment, however, is that quoted from a pamphlet published under the auspices of the London Chamber of Commerce. Complaint is made that the returns furnished in regard to electric light undertakings very often do not show an existing deficit which has to be made up out of the rates; and South Shields is cited as an example. The deficit here up to March 31, 1897, was £2272. The first Board of Trade returns published were for the year ending March 31, 1898, and these did not make it clear that an earlier deficiency of £2272 had been paid off by contributions from the general rates. At South Shields the supply was commenced in 1896. On March 31, 1899, it appears that deficiencies to the extent of £5114 had been made good from the rates; and after deducting some alleged surpluses, there was still a net amount of £3224 against the ratepayers on March 31, 1901. The accounts for another year have now been issued, and the trading can therefore be analyzed down to the 31st of March last. No provision has ever been made for depreciation, renewal, and antiquation of plant. Dealing with these items and (apart altogether from loss in value through the plant becoming old-fashioned and inefficient) merely charging 3 per cent. to cover depreciated value and renewals, the "Chronicle" writer points out that the accounts to date will show an amount of £16,010, which must be met by the ratepayers, sooner or later, as the result of the speculation into which they have been led. His figures are as follows:—

Deficiency shown on the official accounts						£2,630
Depreciation—						
1896 to 1902, £21,290 at 3 per cent. for 6 years						3,828
1897	,,	£13,964	,,	,,	5 ,,	2,090
1898	,,	£17,233	,,	,,	4 ,,	2,068
1899	,,	£29,988	,,	,,	3 ,,	2,697
1900	,,	£39,801	,,	,,	2 ,,	2,388
1901	,,	£10,312	,,	,,	1 ,,	309
						£16,010

This is in addition to the hidden deficiency of £2272, to which attention has already been drawn. Apart, however, from the losses which are admitted on the face of the accounts, there are several matters open to serious comment. The undertaking has already cost £138,801, and if assessed for local rates on the ordinary principle of 3 per cent. on the capital expenditure, it would amount to £4164, which at 6s. in the pound would be £1249, whereas the whole amount debited for rent, rates, and taxes is £193. This is an extraordinary state of affairs, and we agree with the writer that it goes far to justify some of the adverse criticisms passed upon municipal finance.

INCANDESCENT GAS FOR CHURCH LIGHTING.

Another Victory at Newmarket.

We recorded in the "JOURNAL" some time ago, the successful capture by Mr. J. H. Troughton, the Manager and Secretary of the Newmarket Gas Company, of the lighting of St. Mary's Church, in that town, on the incandescent system. We now learn, from a report in a local paper, that he has secured the contract for lighting All Saints' Church in the same way. At a Vestry meeting held a few days ago, he submitted a tender amounting to £35 12s. 6d., including the cost of fixing. If this system were adopted, he guaranteed that the gas bill would be reduced by one-half, and he thought by two-thirds. In

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BLACKBURN	1,250,000	YORK	750,000
WINDSOR ST. WORKS, BIRMINGHAM	2,000,000	ROCHESTER	500,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	KINGSTON, ONT.	300,000
COLCHESTER	300,000	CRYSTAL PALACE DISTRICT	2,000,000
BIRKENHEAD.	2,250,000	DULUTH, MINN.	300,000
SWINDON (New Swindon Gas Co.)	120,000	CATERHAM	150,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000	LEICESTER	2,000,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000	ENSCHEDE (HOLLAND)	150,000
HALIFAX	1,000,000	BUENOS AYRES (RIVER PLATE CO.)	700,000
TORONTO	250,000	BURNLEY	1,500,000
OTTAWA.	250,000	KINGSTON-ON-THAMES	1,750,000
LINDSAY (Remodelled)	125,000	ACCRINGTON	500,000
MONTREAL	500,000	TONBRIDGE	300,000
TORONTO (Second Contract; Remodelled)	2,000,000	STRETFORD	500,000
BELLEVILLE	250,000	OLDBURY	300,000
OTTAWA (Second Contract)	250,000	TODMORDEN	500,000
BRANTFORD (Remodelled)	200,000	SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
ST. CATHERINES (Remodelled)	250,000	YORK (Second Contract)	750,000
KINGSTON, PA.	125,000	ROCHESTER (Second Contract)	500,000
PETERBOROUGH, ONT.	250,000	NEWPORT (MON.)	250,000
WILKESBARRE, PA.	750,000	TOKIO, JAPAN.	1,000,000
ST. CATHERINES (Second Contract)	250,000	PERNAMBUCO (Brazil)	125,000
BUFFALO, N.Y.	2,000,000	MALTON	150,000
WINNIPEG, MAN.	500,000	DULUTH, MINN. (Second Contract)	300,000
COLCHESTER (Second Contract)	300,000		

Complete Gas-Works at NELSON, BRITISH COLUMBIA.

LEEDS, 1,800,000 Cub. Ft. SMETHWICK, 500,000 Cub. Ft. LEICESTER (2nd Cont.), 1,000,000 Cub. Ft.
GRAVESEND, 300,000 C. Ft. BROCKVILLE (ONT.), 250,000 C. Ft. NEWPORT, MON. (2nd Cont.), 250,000 C. Ft.

addition, the church would be much cleaner and cooler than at present, and would be well lighted. They would have lights equivalent to 600-candle power in the chancel, 3000-candle power in the nave, 150-candle power in the vestry, and 50-candle power in each of the two porches. If they had a man who could put mantles on the burners, maintenance would not cost 10s. per annum, or the Company would contract for it. He pointed out that at St. Mary's the cost of lighting with flat-flame burners for the quarter ending March 31, 1901, was £6 18s. 9d.; while in the corresponding quarter of 1902, after incandescent gas had been introduced, it was £1 11s. 5d. The total gas bill for the first six months of this year with incandescent burners was £2 13s. 8d., as against £9 13s. 10d., with flat-flame burners, in the first half of 1901—a saving of £7 0s. 2d. in the six months. In addition, the church was beautifully lighted, and the air kept cool and pure. The Manager of the Electric Light Company (Mr. F. A. Simpson) also tendered for the lighting of the church. He said the Company were prepared to wire the church, and fit it up free of charge with plain fittings, for all the lights the Vicar and Churchwardens considered necessary. The price of current would then be 7½d. per unit, instead of 7d.; and if the maximum demand was exceeded, the price would be, for all current used above that figure, 4½d. per unit instead of 4d. If more elaborate fittings than those ordinarily supplied for free wiring were required, the cost would have to be borne by the Vicar and Churchwardens; but the fittings would be fixed free of charge. Supposing that 64 16-candle power lamps, or lights equivalent, were installed, the price of current per hour would be, approximately, 2s. 6d. at 7½d. per unit. After some discussion, a vote was taken, and the numbers were equal for the two systems. Subsequently, the matter was left to the decision of the two Churchwardens, who gave it in favour of the Gas Company.

Frizinghall and Heaton Gas Supply.—With a view to redressing the grievance of the inhabitants of the Heaton and Frizinghall districts of the city as to the price they have to pay for gas, a deputation of the Bradford Corporation Gas Committee last Wednesday waited upon members of the Shipley Urban District Council. The districts concerned were in the supply area of the Shipley Gas Company, whose undertaking has been acquired by the Council, and consumers are charged 3s. 4d. per 1000 cubic feet against 2s. 3d. in the area supplied by the Corporation. The object of the proceedings was to open negotiations for the purchase by the Corporation of the mains in that portion of the Company's area of supply which lies within the boundaries of the city, without having to resort to parliamentary procedure. Mr. J. Roberts (Chairman of the Gas Committee of the Shipley District Council) was in the chair, and Mr. J. Freeman (Chairman of the Bradford Gas Committee) spoke for the deputation, which included the Gas Engineer (Mr. C. Wood). They were received in a friendly spirit, and there are hopes that the negotiations may be brought to a successful issue.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The accounts of the Glasgow Corporation Gas Department for the year ending May 31 have come to hand, particulars of which I have already sent you [see p. 513.]. Appended thereto is the report of the Gas Committee, which, considering the magnitude of the undertaking, is a brief document. This is due to the method which is adopted by the Corporation for the management of the concern. The Gas Committee manage it; and except in the matter of large schemes, they only report results to the Town Council. This everyone will concede is the method which is most likely to conduce to prosperity. In a trading concern, it is inadvisable to give details of transactions, which would be of use to traders who do business with the body, and which the public would not understand. So long as the results are satisfactory, the public ought to be satisfied. The same practice is followed in company management. The directors carry on the business, and if, as sometimes happens, it is thought that they are unequal to dealing with the affairs under their charge, a committee of shareholders is appointed to assist them; but the shareholders ordinarily know no more of the working of the concern than do the general public. When a big scheme, or a new departure, is contemplated, the sanction of the body who are to furnish the means is asked; but that is all they have to do with it. This is the principle upon which the Glasgow Corporation Gas Department is conducted; and the results are always highly satisfactory. Experience has shown that this is so; and the community have learned to have confidence in the Gas Committee and its officials. In some of the smaller corporations (and some of them are not so small either), the principle seems not to be understood—at least, it is not followed. The members of those corporations seem to consider it to be their duty, not only themselves to know what is going on, but to take a delight in making the details of the business known. The Glasgow method is the best for the undertaking. The quantity of gas manufactured during the year was 6,364,067,800 cubic feet—an increase of 242,700,300 cubic feet over the preceding year. The gas accounted for amounted to 5,688,280,041 cubic feet—an increase of 213,156,041 cubic feet, fully 2¾ per cent. Unaccounted-for gas amounted to 675,787,759 cubic feet, which is equal to 10·62 per cent. of the quantity made.

It is satisfactory to see that the debit balance which was incurred last year has been so far reduced. The current year should see it out of existence. The Corporation do not play for large balances. Their object rather is to conduct the undertaking so that, year by year, the revenue shall, as nearly as possible, meet the expenditure. They are reducing the price of gas by 2d. per 1000 cubic feet. Assuming the natural increase in the consumption of gas to be maintained, and taking into account the more favourable purchases which have been effected, if £39,000 of a surplus was earned last year, there should be about £30,000 of a surplus this year; but then there must be taken into

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Over A MILLION

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Cookers are

in daily use.

account the increased interest upon borrowed money, and the new sinking fund provisions, which will make less any surplus that may be earned. There remains to be noticed the new departure with reference to the supply of gas for motive power. It is well known that the practice of the Corporation has been to make a uniform charge for gas for all purposes. Now they are to make a departure from that; and, in accordance with their method of doing business, the Gas Committee ask the sanction of the Town Council to the change. They are proposing to make a reduction of only 4d. per 1000 cubic feet for gas used for motive power, which is not much relief to the owners of gas-engines; but as the proposal may be somewhat of an experiment, if the new arrangement works satisfactorily, a further reduction will doubtless be made in following years.

The Corporation of Port Glasgow on Tuesday accepted offers for the supply of 4700 tons of coal for the gas-works, at the average price of 14s. 7¾d. per ton. The estimated yield of gas is 44,900,000 cubic feet of 25-candle power, or at the rate of 9500 cubic feet per ton. The Council fixed the amount of contribution to the sinking fund at £525, which is at the rate of 3 per cent. on £17,500, the present debt on the gas undertaking.

The Corporation of Perth on Monday were moved by Mr. M'Pherson to rescind a resolution which they previously adopted, in which they refused to sell a portion of the site of the old gas-works to the City of Perth Co-operative Society. It was pointed out that the subject was fully discussed a month or two ago, and that the business of the Council could not be carried on if they were to transact business one month and rescind it the next. All the same, the motion was carried by ten votes to nine.

The Corporation of Broughty Ferry are wobbling upon the question of the charge for connecting gas-cookers. They used to make the connections free; but this was found to be illegal. They then laid on a heavy charge, which put a stop to the demand for cookers. On this being realized, a modified charge of 2½ per cent. a year for twenty years, on the cost of making the connection, was imposed. This works out at the sum of 2½d. a year—a result which surely could not have been foreseen, otherwise it would not have been adopted. At Monday's meeting of the Town Council, Mr. Christie, the Convener of the Gas Committee, obtained the suspension of the Standing Orders, and moved that the existing arrangement be rescinded. He contended that it was absolutely unworkable, and was calculated to retard the hire of gas appliances, and, through this, the consumption of gas. Provost Gray moved that, as the resolution to charge 5 per cent. was agreed to unanimously so recently, and as Mr. Christie had not indicated a better resolution, no change be now made. He agreed with Mr. Christie that the payment of 5 per cent. per annum only made the resolution unworkable; but why should not the hirer pay up the cost at once? As to the necessity of fostering the sale of gas now, it was perhaps unfortunate that such should have to be done. After discussion, a vote resulted in Mr. Christie's motion being carried. He then moved that in future a sum of 1s. be charged on all fixings irrespective of cost. Free connections were made in other places; but it was only to get over the legal point which had been raised that he proposed that the nominal sum of 1s. be charged. In answer to Provost Gray, the Town Clerk indicated that, while the motion involved an observance of the letter of the law, it involved a similar evasion of its spirit as that of the 5 per cent. per annum charge. A counter-motion was submitted by Mr. Lindsay, to the effect that, instead of a written guarantee to pay the 5 per cent. per annum charge, hirers should only require to give a verbal guarantee. Seeing that the average cost of fixing cookers had been stated to be 4s. 2d., to adopt the motion would mean a loss of 3s. 2d. each. This was far too big a loss. Mr. Lindsay's motion was carried by six votes to two. The arrangement adopted does not seem to be in any degree more legal, or more workable, than the one which was given up.

More about Perth, and I am sorry that I cannot make my remarks of a complimentary nature; but this would be out of the question. There is one element of consolation in the matter, and that is that it is the Corporation and not the responsible Gas Manager whom I find fault with. It is of the fee of Mr. Thomas Newbigging, of Manchester, for his services in inquiring into the complaints of the alleged increases in gas bills that I write. The Corporation met in Committee on Thursday to consider it. That means that they were conscious that they could not afford to let their remarks on the subject be made public. Being a public body, they could not, however, retain their decision in the privacy of their own bosoms. It is a pity, for their own sakes, that they could not, for it is bad enough. Mr. Newbigging's bill, including outlays, amounts to £177 3s. The Council have agreed to offer him his outlays—£20 3s., and 73 guineas (£76 13s.) of a fee. How they have arrived at the latter figure I cannot understand. Mr. Newbigging's fee was £157. If the Council had halved it, the sum they would have offered him would have been £78 10s. and outlays. I can only account for the arbitrary figure by their having each written down the sum they were prepared to offer, and then averaged the total. This is a method which is frequently adopted by juries in assessing damages; but it is an entire abnegation of all righteousness and justice, because few write down what they truly consider should be given. Those who are in favour of a large sum put down the full amount; and those who lean towards a small sum make their figure less than they really think should be given, in order to pull down the average. If that was the way this sum was arrived at in Perth, it is not evidence of business capacity. But, indeed, the whole affair is indicative of lack of business methods. The Corporation could have settled the business themselves, with the exercise of a little trouble. But they chose to call in the assistance of the best man they could find; and now they grudge to pay him. They entered upon the procedure without counting the cost. Of course, their expectation really was that Mr. Newbigging would arrive at a different finding; and when he declined to curse, they decline to pay. Their view of an independent inquiry is, I hope, peculiar to themselves among corporations. I still maintain that those who gave up their right of private judgment and called in an oversman should themselves pay him.

The Corporation of Dumfries had before them last week the report

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SULPHATE OF AMMONIA PLANTS.

of the Manager of the Corporation gas-works (Mr. G. Malam) for the year ending May 15 last. It stated that the quantity of coal carbonized was 9267 tons, with 224 tons of shale oil, at an average cost of 19s. 1·83d. per ton for coal and oil. The quantity of gas manufactured was 92,564,000 cubic feet, which was a yield equal to 9752 cubic feet per ton. The quantity of gas sold, including that used in works, amounted to 80,094,088 cubic feet, which was equal to 8438 cubic feet per ton. Unaccounted-for gas amounted to 13·47 per cent. of the quantity manufactured. The net profit for the year was £624. Mr. Malam recommended, in view of the probable necessity for rebuilding one of the retort-benches at an early date, that a much larger sum than usual be placed to the reserve fund—say £400—to be available for that purpose. He had allowed for a new loan of £15,000 to carry out extensions at the gas-works. An estimate appended to the report showed a prospective balance, at the end of the current year, of £4705, if the price of gas were retained at 3s. 8d. per 1000 cubic feet; of £660 if the price were reduced to 3s. 6d.; and of £352 if it were resolved to bring it down to 3s. 5d.

The Gas Committee recommended that Mr. Malam's report be adopted, and that the price of gas be fixed at 3s. 6d. per 1000 cubic feet (a reduction of 2d.), and that the price of coke be reduced 1s. per ton. Mr. Currie, the Convener, moved the adoption of the recommendations. He said they had had a very satisfactory year, and were now in the happy position of being able to take off the 2d. which they were obliged to put upon the price of gas last year, and to place £400 to the reserve fund. This was certainly very gratifying, not only to the Council, but likewise to the Manager and everyone concerned. The recommendations of the Committee were adopted. At the same meeting, tenders were accepted for the fitting up of a new Cornish boiler and connections at the gas-works, at a cost of £190, to take the place of one which is about worn out, but which is to be retained as an auxiliary; and it was agreed that the renewal of mains and service-pipes be on a more extensive scale than usual. The latter proposal was doubtless agreed to by the town councillors in view of the leakage which exists.

Now that the Bothwell and Uddingston Gas Company have obtained their Provisional Order, which greatly enlarges the scope of the Company's operations and strengthens it financially, the first step they have taken is the very wise one of making due provision for the Manager—Mr. L. Hislop—whose duties will be much increased. It is with pleasure that I note that on Tuesday the Directors of the Company resolved to increase Mr. Hislop's salary by £75 a year, the increase to take effect as from May 1 last. This is, in truth, a very lively sense of favours which have still to come. The Directors have done their part in a right and proper spirit; there is no fear, I am sure, as to Mr. Hislop doing his.

This week, too, the Corporation of Hamilton increased the salary of their Manager (Mr. J. Ballantyne) by £50 a year, which is also a well-merited advance, as Mr. Ballantyne's labours since he went to Hamilton have been exceedingly arduous.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Aug.* 16.

Sulphate of Ammonia.

The market has been somewhat irregular, there having been a considerable divergence between the highest and the lowest prices reported paid. The closing quotations are, however, £11 17s. 6d. per ton f.o.b. Hull, and £12 to £12 2s. 6d. per ton f.o.b. Leith and Liverpool. Demand has been mainly for prompt and early delivery, and everything offered has been readily disposed of. Buyers, moreover, continue to press for deliveries on August contracts. For September delivery, buyers are not interested unless at a discount of about 5s. per ton on prompt prices. For October-March delivery, makers are quoting £11 10s. to £11 12s. 6d. per ton; but speculators are offering abroad at the parity of about £11 5s. per ton, and, consequently, no first hand business is reported.

Nitrate of Soda.

This is quiet but steady at 8s. 4½d. per cwt. for ordinary, and 8s. 7½d. for refined quality, on spot.

LONDON, *Aug.* 16.

Tar Products.

There is very little business doing; the markets as a rule having a downward tendency. The position of pitch remains the same; but there is more disposition on the part of consumers to buy all over next year, provided manufacturers meet them as regards price. Crude carbolic is certainly weaker; business being reported in 60's at 1s. 8d. prompt, while consumers offer only 1s. 7½d. for September-December. As regards crystals, business has been done in 34-35's at 5d. per lb., early delivery; but in 39-40's sales have been made at 5⅜d. The position of creosote remains unchanged. There is perhaps a little better demand for export, but for home consumption business is limited. There is no change to report in solvent or toluol, both of which appear to be quite neglected. In benzol, a little business has been done in pure at 1s.; but for 90 per cent. consumers offer only 7½d. at outports, which price makers decline to accept. In 50-90 per cent. there are rumours of business having been done at 6½d., early delivery. Anthracene remains in the same position. There is a limited inquiry for the best quality; but the "B" makes are practically unsaleable

The average values during the week were: Tar, 18s. to 22s. 6d. Pitch, London, 50s. to 52s. 6d.; east coast, 47s. 6d. to 48s. 6d.; west coast, 43s. 6d. to 44s. Benzol, 90 per cent., 7½d. to 8d.; 50-90 per cent., 7d. Toluol, 8d. Crude naphtha, 2½d.; solvent naphtha, 8d. to 8½d.; heavy naphtha, 9d. to 10d. Creosote, London, 1¼d.; North, 1d. Heavy oils, 1⅝d. Carbolic acid, 60 per cent., 1s. 8d. to 1s. 8½d. Naphthalene,

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Sulphate of Ammonia.

The markets are quiet; and there is really no business to report. The Beckton position remains unchanged. The Gaslight and Coke Company decline to reduce their price, but would accept £12 for September and £11 15s. for October-March. Consumers, however, are not prepared to pay these prices at present, believing in lower values forward. In Hull, some quantity has been sold at £11 17s. 6d. for prompt, and £11 7s. 6d. for October-March. In Leith, business appears to be very limited. Sellers still ask £12 for prompt, but consumers will not pay more than £11 17s. 6d., and are not anxious buyers even at this price. As regards forward delivery, there is nothing to report.

COAL TRADE REPORTS.

Lancashire Coal Trade.

Business in the coal trade continues to move on slowly through the summer season, with most of the collieries running short time, and stocks in the better qualities accumulating, but not to any large extent. The demand for house-fire consumption is necessarily exceedingly small, but quite up to, if not above, the average for the time of the year; and prices are steadily maintained at the recent quoted basis of 13s. 6d. to 14s. per ton at the pit for best Wigan Arley, 12s. to 12s. 6d. for Pemberton four-feet and seconds Arley, and 9s. 6d. to 10s. for common house coal. Common round coals are still in not more than moderate inland request for steam and forge purposes; but quotations are steady at 8s. 6d. to 9s. at the pit. For shipment, there has been more inquiry stirring, and prices are not cut quite so low as of late—good qualities of steam coal fetching about 10s., and house-fire descriptions 12s. 6d., delivered at the ports on the Mersey. There is nothing further of special moment to report with regard to gas coals, except that collieries are very firm in their prices, and certainly not disposed to make any concession on full current rates on forward contracts. All the better sorts of engine fuel continue in brisk request, with supplies, if anything, short to meet the demand. At any rate, most collieries are unable to entertain new business beyond the requirements of their regular customers; and with less surplus slack coming in from other districts, prices have a tendency to stiffen. At the pit, best sorts of unwashed Lancashire slack are firm at 6s. 6d. to 7s. per ton, with common sorts only in very exceptional cases quoted under 5s. For coke, a pressing inquiry is reported, and local makers find it difficult to keep up the requisite deliveries to customers. Prices are strong at about 22s. to 24s. for foundry, and 13s. 6d. to 14s. 6d. for furnace cokes, at the ovens, with a tendency to harden on these figures where new business is offered.

Northern Coal Trade.

With a fuller production of coal, there has been a better demand; so that the trade has been more active, though the prices show a slight ease, as the output is a little better than had been expected. In the steam coal trade, best Northumbrian kinds are steady with a full demand, the price being now about 11s. 6d. per ton f.o.b. Second-class steams are relatively more plentiful, and are quoted at from 9s. 9d. to 10s. 6d. per ton f.o b.; while steam smalls are 5s. to 5s. 6d. per ton. The collieries are now generally fully at work, and the shipments are heavy. In the gas coal trade, the demand is steady for export; and the home consumption now begins to show signs of increase, though it is moderate to the large requirements of winter. The price of Durham gas coals is not materially altered this week—from 9s. to 10s. per ton f.o.b. being quoted, according to the class of coal, and the best kinds being the steadiest. No additional contracts of moment are noted. There is a strong demand for nearly all kinds of coke; and prices show general firmness. Best Durham export coke is from 17s. 6d. to 18s. 3d. per ton f.o.b., and blast-furnace coke from 15s. 6d. to 15s. 9d. per ton free on Teesside. Gas coke is rather scarce; the shipments being fair, and the make still only moderate. Prices of gas coke vary, but from 11s. 6d. to 11s. 9d. per ton f.o.b. may be looked on as current quotations on Tyneside.

Scotch Coal Trade.

The coal trade in Scotland is showing better at present than it has done for a long time; but it is not to be forgotten that this is the heydey of the Fife trade, there being always a rush to get coal to the northern Baltic ports before they are blocked by ice. There is also a good local demand, and the output is going off promptly. There is a proposal, however, by the coalmasters to still further reduce the wages of the miners; and as these are already as low as the miners consider they ought to be, there is fear of trouble. The prices quoted are: Ell 9s. 3d. to 9s. 6d. per ton f.o.b. Glasgow, and splint 9s. to 9s. 6d. The shipments for the week amounted to 247,883 tons—an increase of 27,820 tons over the previous week, and of 18,976 tons over the corresponding week of last year. For the year to date, the total shipments have been 6,230,190 tons – an increase of 630,153 tons upon the corresponding period of last year.

Goole Gas and Water Finances.—Although (says the "Hull News") the balance-sheet of the Goole Gas and Water Committee has not yet been made public, there is a pretty shrewd idea abroad that there is a deficit of something over £1000 on the year's working. Animated discussions are taking place on the subject among the members of the Gas and Water Committee; and there are various explanations offered. It is now well-known that Mr. Matt Dunn, the Gas Engineer, has been appointed to a similar position at Stockton; and, in consequence, he has tendered his resignation.

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Gas Supply of Yokohama.—We learn from the "Financial News" that the gas undertaking in Yokohama, which is owned by the Municipality of the city, is doing its business with a fair profit; but, owing to some other circumstances, the municipal authorities have, it is said, begun to consider the advisability of selling the concern to private individuals.

Public Lighting at Truro.—The Truro City Council confirmed on Wednesday an agreement with the Gas Company for the lighting of the town during the ensuing year on the same terms as last. Disappointment was expressed by one member that the price showed no reduction, seeing that coal was now cheaper than it was a year ago. The Mayor (Mr. J. James) remarked, in explanation, that at the present time the profits of the Gas Company were not what they ought to be, and that accidents such as had occurred at the works had to be paid for, and this prevented an immediate reduction in the price of gas to the consumers.

Devonport Gas-Works Purchase.—A report presented to the Devonport Town Council on Thursday set forth that the Devonport Gas Company had claimed to be entitled to receive from the Corporation £10,015 8s. 6d., in addition to the £141,196 7s. paid to them in May last, and that the Gas Committee had agreed to a settlement of the claim for £1000. There was likewise a balance due to the Company on the account stated between them and the Corporation of £326 19s. 5d.; and this also had been paid. It appeared that the Company's bill of costs in reference to the arbitration amounted to slightly more than £3000. The Gas Committee, in the first instance, instructed the Town Clerk to carry the bill in for taxation; but it being impossible to get it taxed before the Long Vacation, it was decided to pay the sum of £1000 on account.

Street Openings in Bradford to be Regulated in Future.—The minutes of the Water Committee of the Bradford City Council, as approved at the last meeting of this body, contained the following entry: "That in future all traction cables shall be laid under the carriageways instead of, as at present, in the footways; that when any gas or water mains, or electric lighting, or traction cables require to be laid, the City Surveyor, the Water-Works Engineer, the Gas Engineer, and the Electrical Engineer do confer as to the route to be followed; and that before trenches are covered in, the mains or cables therein be inspected, and their positions approved by responsible officers on behalf of the City Surveyor's, Water, Gas, and Electricity Departments." In Bradford, as in many other places, there has hitherto been a great deal too much independence of action on the part of the Committees, says the "Bradford Observer;" and a by no means inconsiderable sum of money has been wasted in breaking up pavements which have only recently been laid down—to say nothing of the inconvenience suffered by the public as the result of such official muddling. The co-operation of the leading officials of the Council concerned in such matters should for the future prevent further waste of this kind.

Proposed Extension of the South Molton Gas-Works.—The question of extending the gas-works was under consideration at a meeting of the South Molton Town Council last Tuesday. The Town Clerk said that difficulties had arisen through four owners of property objecting to the use for gas-works purpose of land adjoining the present works; and if the opposition were persisted in, the Council would have either to obtain a Provisional Order or consider the question of removing the works to a new site. Alderman Moor moved that a Provisional Order be applied for, and said that an extension of the works was really necessary. Alderman Shapland moved, as an amendment, that only small sums should at present be spent in carrying out absolutely necessary improvements at the gas-works. He thought the town should be lighted by electricity, and gas used for lighting and heating purposes. Mr. Blake seconded the amendment, and contended that the present works could, without large additions, be made to meet the requirements of the town for some time to come. Mr. W. Sanders, one of the opponents of the scheme, also expressed the opinion that the present works were large enough for the needs of the town. The Mayor (Mr. F. Day), however, pointed out that the consumption was increasing, and the Gas Manager had reported that additional plant was necessary if they were to be prepared to meet the growing demands. It was decided to apply for an Order. Mr. Sanders said he would withdraw his opposition rather than put the town to the cost of obtaining an Order.

The Lighting of Okehampton.—After being in darkness for several weeks, the public lamps at Okehampton were lighted again last Friday week. This marked the conclusion of the long controversy which has taken place between the Corporation and the Gas Company as to the terms on which the lighting should be carried out. The subject was finally before the Town Council on Wednesday, when the proposed agreement was once more submitted for consideration. Attention was drawn to an additional clause to the effect that if the Company were unable, by accident at the works, to supply gas for any period during the term of five years, they should be at liberty to supply another illuminant for such period, provided that they took without delay steps to remedy any defect which might lead to the non-supply of gas. Mr. Fugler moved an amendment that in case the Company should at any time during the term of five years be by accident prevented from supplying gas, they should not be held responsible to supply it during that period. After some discussion, however, it was lost. Mr. Cornish moved that the seal of the Corporation be affixed to the agreement. The Town Clerk suggested an additional clause, providing that if during the next five years the Council desired to become the lighting authority, they should be in a position, on giving three months' notice, to acquire the gas-works by arbitration, in case a price could not be mutually agreed upon. Mr. German thought that the initiative in such a matter should come from the Company. Mr. Stinchcombe moved that the suggestion of the Town Clerk be acted upon; but this amendment was also rejected, and the Council proceeded to seal the agreement.

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Awards in the Tynemouth Water Arbitration.—At a meeting of the Tynemouth Town Council last Wednesday, the Town Clerk (Mr. Adamson) presented a report on the arbitration proceedings which took place a short time ago in Newcastle with regard to the purchase of land by the Corporation for the site of the proposed Font reservoir. The Umpire was Mr. R. W. Cooper; and the Arbitrators were Mr. R. J. Aynsley for the Corporation, and Mr. F. J. Snowball for the claimants or landowners. These latter were Sir George Otto Trevelyan, Bart., the Duke of Northumberland, and Mr. W. Orde, who claimed £17,975, £25,951, and £6545; making a total of £50,471. The arbitration lasted two days; and the Arbitrators having differed, the ultimate decision was left to the Umpire, who has made his award in each of the three claims in the nature of a special case for the opinion of the King's Bench Division of the High Court of Justice. Subject thereto, he has awarded the following sums: To Sir George Trevelyan, £3250; to the Duke of Northumberland, £6250; and to Mr. Orde, £2050—total, £11,550. If the Court shall be of opinion that the Corporation are right in their contention that each parcel of land must be valued as an independent property with regard to the adjoining other parcels of land, the amounts awarded may be reduced to £7425.

The Evesham Town Council have decided to abolish meter-rents, and to allow consumers of 50,000 cubic feet of gas a reduction of 10 per cent.

The Southport, Birkdale, and West Lancashire Water Board contemplate applying to the Local Government Board for an Order authorizing the issue of £250,000 of 3 per cent. redeemable stock. It will be issued simply to repay a number of mortgages for short terms which the Board have already obtained. The total capital of the Board is rather more than £850,000.

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